DOCUMENT RESUME

ED 143 808 CE 012 157

TITLE	A Study of Nationwide Availability of Women & Minorities for Positions in Officials & Managers & Professionals. Employment Categories. Final Report.
INSTITUTION	P/RA Research, Inc., East Meadow, N.Y.
SPONS AGENCY	Energy Research and Development Administration, Washington, D.C. Div. of Labor Relations.
BUREAU NO	ERDA-76-84
PUB DATE	Mar 76
NOTE	224p.; Best copy available
AVAILABLE FROM	National Technical Information Service, U.S. Department of Commerce, 5285 Port Royal Road, Springfield, Virginia 22161
EDRS PRICE	MF-$0.83 HC-$11.37 Plus Postage.
DESCRIPTORS	Affirmative Action; American Indians; Asian Americans; Blacks; Employment Potential; Employment Qualifications; *Employment Statistics; Ethnic Groups; *Females; Information Sources; *Labor Supply; Managerial Occupations; *Manpower Utilization; *Minority Groups; Models; National Surveys; Occupational Clusters; Professional Occupations; Spanish Americans; *Statistical Analysis; Statistical Studies

ABSTRACT

A study was conducted to determine a nationwide availability conclusion percentage of minorities (Blacks, Spanish-origin persons, Asian Americans, and American Indians) and women particularly in job groups of two job categories: Officials and Managers, and Professional. The resulting availability conclusions would then be used to determine underutilization of these minority groups in the two categories. Subsequent to compiling a list of government agencies, colleges, universities, and various associations and societies, over two hundred letters were written and visits were made to collect relevant statistical data. Government agencies provided the most complete and updated data while generally, the private associations, did not provide useful information. Utilizing the eight factors to be considered in determining the availability of minorities and women according to federal regulations, seven factors were identified and considered for both minorities and women in this study, including unemployment, labor force, and degree of training. (This report discusses in detail the methodologies, statistics for each of the availability factors, and a statistical model for determining availability; presents the availability conclusions for the nineteen job groups in the Professional category and the Officials and Managers category in tabular form; and discusses major issues, including an alternate statistical model. Data sources, used and not used, are appended.) (EM)

Documents acquired by ERIC include many informal unpublished materials not available from other sources. ERIC makes every effort to obtain the best copy available. Nevertheless, items of marginal reproducibility are often encountered and this affects the quality of the microfiche and hardcopy reproductions ERIC makes available via the ERIC Document Reproduction Service (EDRS). EDRS is not responsible for the quality of the original document. Reproductions supplied by EDRS are the best that can be made from the original.

ED143808

ERDA 76-84

Final Report For A Study Of Nationwide Availability Of Women & Minorities For Positions In Officials & Managers & Professionals Emnployment Categories

March 1976

Prepared For:
Energy Research & Development Administration
Division Of Labor Ralations
Office Of The Assistant Director For Equal Opportunity

Prepared By:
P/RA Research, Inc.
1905 Hempstead Turnpike
East Meadow, N.Y.
11554

U S DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

REPRODUCED BY
NATIONAL TECHNICAL INFORMATION SERVICE
U.S. DEPARTMENT OF COMMERCE
SPRINGFIELD, VA. 22161

BEST COPY AVAILABLE

CE 012 157

Available From:

National Technical Information Service (NTIS)
U.S. Department Of Commerce
5285 Port Royal Rd., Springfield, Va. 22161

Notice

This report was prepared as an account of work sponsored by the United States Government. Neither the United States nor the United States Energy Research & Development Administration, nor any of their employees, nor any of their contractors, subcontractors, or their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness or usefulness of any information, apparatus, product or process disclosed, or represents that its use would not infringe privately owned rights.

P/RA Research, Inc.

March 9, 1976

Mr. H. T. Herrick, Director
Division of Labor Relations
Energy Research and Development Administration
Washington, D.C. 20545

Ref: Contract No. E(49-1)3790

Dear Mr. Herrick:

We are pleased to submit this final report of "A Study of Nationwide Availability of Women and Minorities for Positions in Officials and Managers and Professionals Employment Categories" resulting from the referenced contract.

We have, in this feasibility study, been able to utilize several of the eight factors specified in the Code of Federal Regulations, Title 41, Section 60-2 in a statistical model to arrive at "availability conclusions" for use in establishing Affirmative Action goals for fiscal 1977. Data sources have been identified and evaluated and statistics and methodologies have been derived and provided.

This study was coordinated by our Program Director, Dr. Sam L. Resnick. He was assisted by Robert Anderson and Valerie Faggart, Research Associates, and Dr. Kenneth Berger, Statistical Consultant.

We wish to express our appreciation to Eric Tolmach, Chief of the Research and Program Development Branch and Barbara McKee, GOCO Women's Program Coordinator for their cooperation and assistance on this program.

As a further note, we are pleased to have participated in this significant and vanguard study initiated by ERDA, Division of Labor Relations, Office of the Assistant Director for Equal Opportunity. The implementation of this study will assist in the development of Affirmative Action Plans and the setting of Affirmative Action goals.

Yours very truly,

Leonard H Fonville

Leonard H. Fonville
President

LHF/gh

1905 Hempstead Turnpike
East Meadow, N. Y. 11554
516 794-5552

WASHINGTON, D. C.
429 N Street, S.W. - Suite 710
Washington, D. C. 20024
202 488-4222

UNITED STATES
ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION
WASHINGTON, D.C. 20545

APR 0 6 1976

Mr. Leonard H. Fonville, President
P/RA Research, Inc.
1905 Hempstead Turnpike
East Meadow, NY 11554

Ref: Contract No. E(49-1)3790

Dear Mr. Fonville:

I would like to thank you for timely submission of your report entitled, "A Study of Nationwide Availability of Women and Minorities for Positions in Officials and Managers and Professionals Employment Categories" and also offer my praise for the excellent work performed.

The data and methodologies developed under the referenced contract should be of great value to this agency and its contractors in planning for affirmative action. We believe, as you do, that this was a vanguard effort and are more than pleased with the results. Your assignment to this project of highly capable and tireless personnel clearly accounts for the quality of the job. This was evident, too, in the skillful--and successful--presentation to the ERDA Assistant Administrator for Administration.

I wish you and your organization the best in future endeavors.

Sincerely,

H T Herrick

H. T. Herrick, Director
Division of Labor Relations

TABLE OF CONTENTS

Paragraph		Page
SECTION 1:	BACKGROUND OF STUDY	1
1.1	History	1
1.2	Purpose of Study	2
1.3	Objectives	3
SECTION 2:	APPROACH TO STUDY	5
2.1	Phases of Study	5
2.2	Implementation of Study	5
SECTION 3:	SUMMARY OF FINDINGS AND RECOMMENDATIONS	14
3.1	Statistical Sources	14
3.2	Timeframe Considerations	14
3.3	Minority Identification	14
3.4	Job Group Distribution	15
3.5	Requisite Skills Factor Statistics	15
3.6	Asian American Utilization	16
3.7	Statistical Model	16
3.8	Asian American Aliens	16
SECTION 4:	REALIGNMENT OF FACTORS	17
4.1	Eight Factors for Minorities	17
4.2	Eight Factors for Women	19
4.3	Factor Alignment Chart	21

TABLE OF CONTENTS (cont'd.)

Paragraph		Page
SECTION 5:	EVALUATION OF DATA SOURCES	23
5.1	Detailed Characteristics, PC(1)D1	24
5.2	Occupational Characteristics (PC(2)7A	25
5.3	Professional Women and Minorities	26
5.4	Technical Paper No. 33	27
5.5	Manpower Report	28
5.6	Current Population Report P-25	29
SECTION 6:	MINORITY PROPULATION, UNEMPLOYMENT AND LABOR FORCE (FACTORS 1-3)	30
6.1	Minority Identification	30
6.2	Minority Population	33
6.3	Minority Unemployment	37
6.4	Minority Labor Force	41
SECTION 7:	WOMEN SEEKING EMPLOYMENT, UNEMPLOYMENT, LABOR FORCE (FACTORS 1-3)	43
7.1	Women Seeking Employment	43
7.2	Women Unemployment	47
7.3	Women Labor Force	48
SECTION 8:	REQUISITE SKILLS	49
8.1	Professional Category	53
8.2	Officials and Managers Category	57
8.3	Engineering	60
8.4	Mathematics	66
8.5	Chemistry	69
8.6	Biology	71

TABLE OF CONTENTS (cont'd.)

Paragraph		Page
SECTION 8:	REQUISITE SKILLS (cont'd.)	
8.7	Physics	72
8.8	Accounting, Computing/Data Processing, Nursing	74
8.9	Physicians	78
8.10	Economics, Library Sciences, Legal	79
8.11	Personnel and Procurement	83
SECTION 9:	PROMOTABLE AND TRANSFERABLE MINORITIES AND WOMEN (FACTOR 5)	85
SECTION 10:	MINORITIES AND WOMEN IN TRAINING INSTITUTIONS (FACTOR 6)	87
SECTION 11:	CONTRACTOR TRAINING (FACTOR 7)	89
SECTION 12:	DETERMINATION OF AVAILABILITY CONCLUSION	91
12.1	Statistical Model for Minorities	92
12.2	Determination of Availability Conclusion for Minorities	97
12.3	Statistical Model for Women	98
12.4	Determination of Availability Conclusion for Women	100
SECTION 13:	AVAILABILITY CONCLUSION	101
13.1	Example for Black Mathematicians	103
13.2	Example for Women Physicians	104

TABLE OF CONTENTS (cont'd.)

Paragraph		Page
SECTION 14:	ISSUES	106
14.1	Professional and Technical Category Statistic from the Department of Labor	107
14.2	Asian American Aliens	109
14.3	Alternate Method	112
SECTION 15:	JOB GROUP COMPOSITION	116
15.1	Job Group and Job Title Analysis	116
15.2	Suggested Job Title Grouping	132
APPENDIX A1:	BIBLIOGRAPHY	144
APPENDIX A2:	WORKSHEETS	162
A2.1	Asian American Worksheets	163
A2.2	Asian American Projections for 1974	168
A2.3	American Indian Projection for 1974	170

LIST OF TABLES

Table Number		Page
6.1	Total and Minority Population	34
6.2	American Indian Population 1900-1970	37
6.3	Minority Unemployment	39
6.4	Minority Labor Force	42
7.1	Women Not in Labor Force and Will be Seeking Employment in the Next 12 Months	44
7.2	Women Not in Labor Force and Will be Seeking Employment in the Next 12 Months	45
7.3	Women Unemployment	47
7.4	Women Labor Force	48
8.1	Professional Category	54
8.2	Professional Participation Rate	55
8.3	Educational Status - Officials and Managers	58
8.4	Educational Status-Engineering	61
8.5	Requisite Skills Factor-Engineering	64
8.6	Educational Status-Mathematics	66
8.7	Requisite Skills Factor-Mathematics	68
8.8	Educational Status-Chemistry	69
8.9	Requisite Skills Factor-Chemistry	70
8.10	Educational Status-Biology	71
8.11	Requisite Skills Factor-Biology	71
8.12	Educational Status-Physics	72
8.13	Requisite Skills Factor-Physics	73

LIST OF TABLES (cont'd.)

Table Number		Page
8.14	Requisite Skills Factor-Accounting, Computing/Data Processing, Nursing	77
8.15	Requisite Skills Factor-Physicians	78
8.16	Requisite Skills Factor-Economics, Library Science, Legal	79
8.17	Years School Completed-Personnel, Procurement	83
8.18	Availability Conclusions-Personnel and Procurement	84
10.1	Freshman Enrollment 1971-1973	88
12.1	Unemployment Ratios of Minorities	95
12.2	Adjustment Factors for Minority Groups	96
13.1	Factor Statistics	102
13.2	Availability Conclusions	105
14.1	Immigration Comparison	110
15.1	Distribution of GOCO Job Titles and Job Groups	119
15.2	Suggested Job Title Grouping	133
A1.1	Sources Used	145
A1.2	Sources Not Used	150
A2.1	Asian American Worksheets	164
A2.2	Requisite Skills Engineers Worksheet	173
A2.3	Requisite Skills Chemical Engineers Worksheet	174
A2.4	Requisite Skills Civil Engineers Worksheet	175

LIST OF TABLES (cont'd)

Table Number		Page
A2.5	Requisite Skills Electrical Engineers Worksheet	176
A2.6	Requisite Skills Mechanical Engineers Worksheet	177
A2.7	Requisite Skills Metallurgical Engineers Worksheet	178
A2.8	Requisite Skills Mathematics Worksheet	179
A2.9	Requisite Skills Chemistry Worksheet	180
A2.10	Requisite Skills Biology Worksheet	181
A2.11	Requisite Skills Physics Worksheet	182
A2.12	Requisite Skills Accounting Worksheet	183
A2.13	Requisite Skills Computing/Data Processing Worksheet	184
A2.14	Requisite Skills Nursing Worksheet	185
A2.15	Requisite Skills Physicians Worksheet	186
A2.16	Requisite Skills Economists Worksheet	187
A2.17	Requisite Skills Library Science Worksheet	188
A2.18	Requisite Skills Legal Worksheet	189

SECTION 1: BACKGROUND OF THIS STUDY

1.1 HISTORY

Executive Order 11246 was issued in 1965 and amended in 1967 requiring Federal contractors and subcontractors to engage in non-discriminatory employment practices and to take affirmative action to ensure that discrimination on the basis of the race, sex, color, religion, or national origin of employees or applicants does not occur.

In pursuance of this order, the Code of Federal Regulations, Title 41, Chapter 60, Part 60-2 entitled "Affirmative Action Programs" was issued in 1974. Subpart B, "Required Contents of Affirmative Action Programs" defines and elaborates upon the requirements of such programs. A workforce analysis must be made listing the "...major job classifications at the facility, with explanation if minorities or women are currently being under-utilized in any one or more job classifications..... Under-utilization is defined as having fewer minorities or women in a particular job classification than would reasonably be expected by their availability". The "availability" of minorities and women is determined by consideration of at least eight factors. These factors are listed, defined and further explained in subsequent sections of this report.

1.2 PURPOSE OF STUDY

The Office of the Assistant Director for Equal Employment Opportunity, Division of Labor Relations, Energy Research and Development Administration as well as the Government-Owned, Contractor-Operated (GOCO) facilities have complied with Title 41 regulations to the best of their abilities. They recognized however, the need for reliable statistical data relevant to each of the eight availability factors and a methodology where these factors can be meaningfully considered and combined into a statistical model to arrive at final "availability conclusions". These availability conclusions are percentage figures to be used for determining underutilization of minorities (Blacks, persons of Spanish Origin, American Indians, and Asian Americans) and women in their workforce analysis for each job classification. The job classifications involved in this study include two EEO-1 occupational job categories designated, Officials and Managers category and Professional category. One of these categories, Professional, is subdivided into a job classification designated as job group. This study therefore required data for minorities and women in 19 Professional job groups and two job categories Officials and Managers and Professional.

Since this study is involved with the Professional category and Officials and Managers category, the labor and recruitable areas are generally accepted and acknowledged to be nationwide. (See ERDA 4208-A, Annex A, C.4. It is, however, recognized that, for other job categories such as Technicians, Office and Clerical,

Laborers, etc., with which this study is not concerned, the labor and recruiting areas are considered to be local.

The purpose of this study therefore, is to determine the nationwide availability of minorities and women in each of the job groups.

The timing for this study was based upon the consideration that the statistics provided as final "availability conclusions" should be used in the development of Fiscal 1977 Affirmative Action Programs (AAP's). Since this study was initiated in mid-1975, the most current and reliable data was that developed in 1974 and issued in 1975. Although this may appear to be a gap, the statistics are still the most current to date.

A supplement to this report will be issued shortly to provide updated and projected statistics for the years 1975 through 1977. This data then will be useable for subsequent year AAP's. Should more current data become available during these ensuing years for any of the availability factors, then by all means, that data should be used.

1.3 OBJECTIVES

The primary objectives of this study include:

a) To collect existing and available national statistical data for each availability factor for each minority and women in each of the job groups in the two job categories.

b) To evaluate the collected data sources in terms of its currentness, reliability, and accessibility.

c) To examine the distribution of job groupings and job titles presently used by the GOCO's.

d) To suggest a recommended grouping of job titles within job groups for uniformity and standardization.

e) To provide, either by direct use or computation, statistical data for each of the eight factors for each minority and women within the designated job groups and job categories.

f) To consider and determine the feasibility of providing a methodology wherein these factors may be meaningfully combined into a statistical model to arrive at a final availability conclusion (in percent) for each of the minorities and women in each job group and job category.

g) To provide training sessions relative to this study.

h) To provide updated and projected statistical data or a methodology for obtaining such data for subsequent years.

SECTION 2: APPROACH TO STUDY

2.1 PHASES OF STUDY

To satisfy the objectives of this study, the implementation for this program was divided into several phases.

a) Collection and evaluation of data sources.

b) Visits with ERDA Operations Offices and GOCO's.

c) Evaluation of several affirmative action programs and methodologies employed by GOCO's.

d) Analysis of job titles and job groups.

e) Determination of statistical data for each of the availability factors.

f) Development of a statistical model.

g) Determination of final availability conclusions.

h) Provide two training sessions.

i) Update and projection of statistical data for use in subsequent years' AAP's.

2.2 IMPLEMENTATION OF STUDY

2.2.1 Orientation

The initial step in this study, as with most studies, involved a visit with the ERDA program officer and staff for the purposes of orientation and general discussion of its implementation. Monthly management meetings were subsequently held with the ERDA program office to discuss the previous months activities, progress, problems and anticipated work for the following month.

2.2.2 Collection of Statistical Data

Subsequent to this initial visit, Gale's Encyclopedia of Associations and telephone books were used to compile a list of associations and societies which may have relevancy to this study. Furthermore, the Federal Directory was used to obtain addresses and phone numbers of Government agencies who may have statistical data relevant to this stuy. A few hundred letters were written to these agencies, associations and societies requesting statistical data. Phone calls were also made to determine the proper contact persons within these agencies and associations. Many personal visits were also made to agencies and associations.

Additionally, visits were made to several local university libraries, public libraries and libraries of minority and women organizations. The governmental book stores in N.Y. and Washington were also visited in pursuance of relevant statistical data.

As a further step in the collection of data, letters were written to each of the Federal Contact Compliance agencies in order to determine exactly what guidelines or methodologies these other agencies may be utilizing in determining availability statistics.

2.2.3 Operations Office and GOCO Visits

Concurrent with the collection aspect of the study, visits were made to the following Operations Offices and GOCO's and contacts made with the listed individuals. The visits provided

information concerning the statistics, sources, and methodologies used by the GOCO's.

ERDA - Oak Ridge Operations Office

Don A. Horsewood
William A. Truex
Bert Maves

Union Carbide-ORNL and Nuclear Division

Dr. Charles Blake

ERDA - Chicago Operations Office

John P. Kennedy
William W. Bankey
Raymond F. Berent

Argonne National Laboratory

Arthur Vervack
Sidney Finley
Ronald A. Johns
Walter Waldrop

ERDA - Brookhaven Area Office

Joseph Freno

Brookhaven National Laboratory

Harvey Thomas
David Schweller
Renee Flack

ERDA - Albuquerque Operations Office

Eloy Gonzales
Charles Justice

Sandia Corp., Albuquerque

Marvin Torneby
Duane Hughes

ERDA - Kansas City Area Office

Robert Bulcock
Charles P. Edwards

Bendix Corp., Kansas City

Berlin Richardson
Lloyd Elrod
Robert Cell

Lawrence Livermore Lab - Univ. California

Manuel Perry
Kerol Ruppenthal
Barry Bolden

ERDA - Richland Operations Office

Robert Hooper
Frederick Rutt
Charles Chandler

Hanford GOCO's

Norma Hubbard - ARHCO
George Barr - ARHCO
Geraldine T. Adams - Battelle N.W. Lab
Muriel Sears - Hanford Environmental Health Foundation
George Harley - Westinghouse
Marvin Bressler - Boeing
Jack McMaster - United Nuclear Corporation

ERDA - San Francisco Operations Office

Kennard Williams
S. Suevon Gee

2.2.4 Screening of Data Sources

As the requested data became available, each was scrutinized for its currentness, reliability, accessibility, methodology of sampling, and population included in the sampling procedures.

The data sources were then classified as to non-statistical, statistical and useable, and statistical but not useable. This provided a separation between relevant and irrelevant material. Generally, it was found that statistical data from associations, societies and quasi-public organizations were not valid in that their sampling was limited to their membership, responses to their survey were small, or were invalid for other reasons. The Bureau of Census, the Department of Labor and HEW proved to have the most reliable and useable data.

Beyond the statistical data, this screening process enabled compilation of a list of additional sources and development of a bibliography (see Appendix A1).

2.2.5 Review of Affirmative Action Programs (AAP's)

During the visits to the GOCO's and Operations Offices, several AAP's were obtained. These were reviewed and the statistical data and methodologies examined. This provided an additional source for an overview of what procedures and methodologies are presently being utilized. During this review, it became apparent that there was a lack of uniformity in the utilization of job groups and job titles among the GOCO's.

2.2.6 Analysis of Job Groups and Job Titles

As a consequence of this finding, it was necessary to determine if there was any commonality in the use by the GOCO's of job titles and job groups. A distributional analysis was made of the GOCO's job titles and job groups. It was found that there was no significant commonality in the use of titles and groups. The Dictionary of Occupational Titles (Department of Labor), as well as the EEO Standard Form 100 Instructions on the descriptions of job categories was used. An analysis was made to determine which job titles fitted into which job groups. A suggested list was developed for the purpose of standardizing and reporting of such job titles and job groups. Understandably, the titles were in many cases non-descriptive and some difficulty was experienced in determining the specific job function involved. However, it was indicated that should the contractor determine that a

job title is better applied to one job group than another job group, the contractor is at liberty to make this change. (See Section 15 for further discussion of this area.)

2.2.7 Development of Work Sheets

Concurrent with the screening of the data sources, work sheets were developed for each of the eight factors for each minority and women and for each job group and job categories. The statistics directly useable from the data sources were inserted in the appropriate work sheet cells. This provided a visual display of exactly what data was available and what data was lacking. Where two or more data sources were available and the statistics differed, all were listed within the appropriate cell. Subsequently the sources were examined in greater detail to determine which of them was a more valid and reliable, as well as, current sampling. In order to complete these work sheets other data sources such as graduate and enrollment data were used to modify or update the obtained statistics. As new and later data became available the work sheets were continually adjusted. The year 1974 was established as being the year for which the most current data was available. 1970 data obtained from the Bureau of Census was the most complete source to use as a base line for statistics. Therefore, all data relevant to these two periods 1970 through 1974 were inserted into the work sheets. In some instances data prior to 1970 was used for the development of projections and trends. Occasionally

some 1975 data was available for a specific factor or a specific job group but was not utilized for the reason that it would not be consistent with the remaining data.

2.2.8 Development of Statistical Model

Concurrent with the compilation of statistics for each of the factors a means for combining as many of the eight factors as possible into a statistical model was being examined. Several methods were developed and analyzed and one approach was finally decided upon as being the most viable. This approach effectively combines statistics in such a way as to counterbalance areas of underutilization.

2.2.9 Availability Conclusions

Utilizing the developed statistical model, quantitative figures obtained for the factors were incorporated and final nationwide availability conclusions arrived at for each job group, and each minority and women.

2.2.10 Training

At this writing, training materials and two training sessions are being planned to convey the scope of this study, methodologies, statistical model and availability conclusions to ERDA staff and GOCO personnel.

2.2.11 Updated Statistics

Statistics are presently being developed to update those presented in this report. They will cover the period of 1975 through 1977 and will be available for the development of AAP's for fiscal year 1978 through 1980 respectively.

SECTION 3: SUMMARY OF FINDINGS AND RECOMMENDATIONS

This section highlights the major findings of this report. Complete discussions of these findings and recommendations as well as others have been included in the pertinent sections of the report.

3.1 STATISTICAL SOURCES

It was found that there was generally a scarcity of statistical sources. Government agencies, such as Bureau of Census, Department of Labor and Department of Health, Education and Welfare provide the most complete and updated data. Private associations did not provide useful information, except for the American Institute of Physics and the Scientific Manpower Commission.

3.2 TIMEFRAME CONSIDERATIONS

Statistics derived were based on a 1974 timeframe and are recommended for use in fiscal year 1977 AAP's, because of the low rate of change of these statistics and because they are the most reliable statistical data at present.

3.3 MINORITY IDENTIFICATION

EEO-1, Standard Form 100 (Rev. 12-75) identifies the minority groups as Negro, Oriental, American Indian, and Spanish-Surnamed American. The Code of Federal Regulations,

Title 41, Chapter 60-2.1 identifies the minority groups as Blacks, Spanish-Surnamed Americans, American Indians and Orientals. ERDA Appendix 4208-A, Annex A, identifies the minority groups as Blacks, Spanish-Surnamed Americans, Native Americans, and Asian Americans.

Consistent with Bureau of Census identifiers it is recommended that the minority groups be identified as Blacks, Spanish Origin persons, Asian Americans and American Indians.

3.4 JOB GROUP DISTRIBUTION

It was found that there was no uniformity in job group, job title, even job category designations for GOCO's, EEO-1 Guidelines, and the Dictionary of Occupational Titles. It is recommended in agreement with Title 41, Chapter 60-3, that the Dictionary of Occupational Titles be used as the single authority for job titles and their grouping designations.

3.5 REQUISITE SKILLS FACTOR STATISTIC

Generally, labor force statistics have been used for basis of the requisite skills factor, i.e., those who were working in a job group or were unemployed, but have worked in a job group, were considered the total number "available with requisite skills" for that job group. This report recommends a methodology for combining labor force statistics and degree data to arrive at a better representation of the requisite skills factor.

3.6 ASIAN AMERICANS UTILIZATION

It was found that Asian Americans are not underutilized, nationwide, except in the Legal job group.

3.7 STATISTICAL MODEL

After investigation it was found that a statistical model could be used to combine four of the availability factors for the purpose of determining availability conclusions.

3.8 ASIAN AMERICAN ALIENS

The possible problem of the impact of Asian American Aliens has been addressed in Section 14 of this report. It is recommended that agencies responsible for Affirmative Action compliance more closely scrutinize this situation.

SECTION 4: REALIGNMENT OF FACTORS

According to Title 41 of the Code of Federal Regulations, there are eight factors to be considered in determining the availability of minorities and women. The factors are herein listed as they appear in the Code.

4.1 EIGHT FACTORS FOR MINORITIES

Title 41, Chapter 60-2.11, (b) (1), Code of Federal Regulations:

> In determining whether minorities are being underutilized in any job classification the contractor will consider at least all of the following factors:
>
> (i) The minority population of the labor area surrounding the facility;
>
> (ii) The size of the minority unemployment force in the labor area surrounding the facility;
>
> (iii) The percentage of the minority work force as compared with the total work force in the immediate labor area;
>
> (iv) The general availability of minorities having requisite skills in the immediate labor area;

(v) The availability of minorities having requisite skills in an area in which the contractor can reasonably recruit:

(vi) The availability of promotable and transferable minorities within the contractor's organization;

(vii) The existence of training institutions capable of training persons in the requisite skills; and

(viii) The degree of training which the contractor is reasonably able to undertake as a means of making all job classes available to minorities.

It is generally accepted that for the Professional category and Officials and Managers category the labor and recruitment areas are to be considered nationwide. Therefore the distinction between (iv) "immediate labor area" and (v) "area in which the contractor can reasonably recruit" is eliminated and these factors can be combined.

The realigned factors for minorities are:

1. (i) Minority Population (nationally)
2. (ii) Minority Unemployment Force (nationally)
3. (iii) Minority Labor Force (nationally)
4. (iv and v combined) Availability of minorities having requisite skills (nationally)

Factors 1 through 4 are considered External Availability Factors since they are reflective of the sources of personnel which lie outside of the company or organization.

Factors 5, 6, and 7 correspond to Title 41, factors vi, vii, and viii respectively. Factors 5 (vi) and 7 (viii) are internal sources of personnel and are therefore considered Internal Availability Factors.

Factor 6 (vii) has been adapted for the purpose of this report to read "minorities in training institutions capable of training them in requisite skills". This adaption has been made since it relates the availability of minorities both proportionately and numerically. A consideration of the number of institutions (which is required in Title 41) does not take the number or proportion of minorities in these institutions into account.

Factor 6 (vii) is considered a Forecasting Availability Factor since it does not relate to the immediate availability of minorities but rather provides a measure of the future availability of minorities.

4.2 EIGHT FACTORS FOR WOMEN

Title 41, Chapter 60-2.11, (b) (2), Code of Federal Regulations:

In determining whether women are being underutilized in any job classification, the contractor will consider at least all of the following factors:

(i) The size of the female unemployment force in the labor area surrounding the facility;

(ii) The percentage of the female workforce as compared with the total workforce in the immediate labor area;

(iii) The general availability of women having requisite skills in the immediate labor area;

(iv) The availability of women having requisite skills in an area in which the contractor can reasonably recruit;

(v) The availability of women seeking employment in the labor or recruitment area of the contractor;

(vi) The availability of promotable and transferable female employees within the contractor's organization;

(vii) The existence of training institutions capable of training persons in the requisite skills; and

(viii) The degree of training which the contractor is reasonably able to undertake as a means of making all job classes available to women.

Again, with the understanding of a nationwide recruitment area for the Professional category and the Officials and Managers category, factors (iii) and (iv) for women have been combined. Also, factors

for women are not the same as those for minorities. The following realignment has been developed so that the same numbered factor, (for example, Labor Force-Factor 3), applies to both women and minorities.

Realigned factors for women are:

1. (v) Women Seeking Employment (nationally)
2. (i) Women Unemployment Force (nationally)
3. (ii) Women Labor Force (nationally)
4. (iii and iv combined) Women having requisite skills (nationally)

Factors 5, 6, and 7 for women correspond to (vi), (vii) and (viii) respectively and also correspond to the same numbered factors for minorities. The distinction between factors 1 and 2 for women is discussed in Section 7.

4.3 FACTOR ALIGNMENT CHART

The following chart aligns the factors to be considered for women and minorities as they are treated in this study. The generic name applied to each factor is also included for reference.

Minorities	Women	Generic Name
1		Population
	1	Seeking Employment
2	2	Unemployment
3	3	Labor Force
4	4	Requisite Skills
5	5	Promotable or Transferable

Minorities	Women	Generic Name
6	6	Minorities/Women in Training Institutions
7	7	Degree of Training

SECTION 5: EVALUATION OF DATA SOURCES

In the preparation of this study, well over two hundred letters were sent out, numerous phone calls as well as personal visits were made to government-agencies, colleges and universities and various societies and associations.

The most useful data received, came from the U.S. Department of Commerce, Bureau of Census, the U.S. Department of Health, Education and Welfare (HEW) Offices of Civil Rights and Education and the U.S. Department of Labor, Bureau of Labor Statistics.

The following sources discussed were used extensively in determining a base for the 1974 figures. They were chosen over other sources because they represent the best estimate of the population, they are random surveys and they present figures for total population, women and each of the minorities.

5.1 DETAILED CHARACTERISTICS, PC(1)D1, U.S. SUMMARY 1970

This publication of the U. S. Department of Commerce, Bureau of the Census, summarizes the population and the socio-economic characteristics of the population.

The source of the data is the 1970 decennial census, which is based on a sample of the U. S. population. Comparisons are also made, in some cases with the statistics of the 1960 decennial census.

Table 189 was used for total population data by age, race and sex and was also used for total population statistics for persons of races other than white and for persons of Spanish heritage by age and sex.

The total population figures were used to establish a 1970 base for total population, all races, ages and both sexes as well as figures for women, Blacks, persons of Spanish Origin, Asian-Americans and American Indians.

The labor force figures in PC(1)D1 did not adequately represent the total racial composition of the labor force in the detailed occupations, since statistics were only available for total population, Black and persons of Spanish Origin.

5.2 OCCUPATIONAL CHARACTERISTICS, PC(2)7A, SUBJECT REPORTS , 1970

This report is one of a series published by the U. S. Department of Commerce, Bureau of Census and is a summary of the characteristics of the labor force by detailed occupation, race, age, Spanish Origin and educational attainment, etc. The data presents national and regional statistics in depth for the labor force.

The detailed occupations in PC(2)7A are classified according to the system developed for the 1970 census. This system consists of 441 specific occupations arranged into twelve major occupational categories. This method of occupational classification is basically comparable to that used by the U. S. Department of Labor, Dictionary of Occupational Titles (DOT) with its use of major and intermediate occupational classification.

PC(2)7A data was used mainly to define the base for 1970. Labor force figures were obtained from table 1 for total labor force, by race, sex and Spanish Origin in detailed occupations for 1970. Tables 2 through 5 dealt with the educational attainment of workers by detailed occupation and sex, for total labor force and for Blacks and persons of Spanish Origin. These tables were used to determine the average level of education of persons in specific occupations.

5.3 PROFESSIONAL WOMEN AND MINORITIES - "A MANPOWER RESOURCE SERVICE" , MAY 1975 -

This report, published by the Scientific Manpower Commission became available in May,1975, and is updated semi-annually. A monthly supplement is also published, highlighting new developments of interest in selected fields, entitled "Manpower Comments" - "Science, Engineering, Technology".

Professional Women and Minorities was a useful source for obtaining general enrollments in undergraduate programs as well as extensive data on enrollments in and graduates of doctoral programs. The number of graduates with bachelor's, master's and doctoral degrees was available by sex for selected years to 1973 in the fields of science, mathematics, engineering and the social sciences. Extensive minority data was also available in the fields of chemistry, engineering and medical/health.

The degree data that was used in arriving at 1974 Requisite Skills factor 4, was taken from this source.

5.4 CHARACTERISTICS OF PERSONS IN ENGINEERING AND SCIENTIFIC OCCUPATIONS FOR 1972, TECHNICAL PAPER NO. 33, APRIL 1974

This report is published by the U.S. Department of Commerce, Bureau of the Census. The survey for this report was conducted as a joint venture by the Bureau of Census and the National Science Foundation.

Presented in this report are statistics concerning the educational attainment, highest degree held in 1972 by major field of study and detailed occupation by sex and age, of persons from the 1970 census.

The population surveyed in 1972 was a sample chosen in 1970 and the statistics deal with some of the socio-economic characteristics that changed in the sample population from 1970 to 1972.

The report was used for projecting the labor force consisting of scientists and engineers and as a resource for determining the requisite skills for scientists and engineers.

Technical Paper No. 33 was used to examine the education profile of scientists and engineers, and compare the apparent field of study relative to particular occupation and the actual educational field of specialization of persons in those occupations.

5.5 THE MANPOWER REPORT, MESSAGE FROM THE PRESIDENT OF THE UNITED STATES, APRIL 1975.

This report is transmitted to the U. S. Congress annually in April and is jointly issued by the U. S. Department of Labor - Manpower Administration and the U. S. Department of HEW.

General discussions of annual averages of employment and unemployment, trends and special worker traits are included in the text, followed by statistical tables showing annual averages from 1947 to 1974.

The statistics for labor force, employment and unemployment were classified by race, age, sex and broad occupational group.

The statistics used in this report were obtained from tables A15 through A17 and included labor force totals, labor force of "Blacks and others" and women labor force; unemployment rates and number of unemployed persons for the classifications of "Total", "Blacks and others" and "Women". These statistics were chosen because data was available from 1947 to 1974 and no other source had such complete and current data for labor force and unemployment statistics.

5.6 POPULATION ESTIMATES AND PROJECTIONS, CURRENT POPULATION REPORTS, SERIES P-25 No. 606. July 1975.

This report was published by the U. S. Department of Commerce, Bureau of the Census, for the time period January 1, 1970 to June 1, 1975 including monthly estimates for 1973 to June 1975.

The estimates are based on the decennial census, estimates of birth and death rates, immigration statistics and statistics on the mobility of persons in Puerto Rico and the U. S. mainland.

The estimates were used to arrive at the 1974 total population.

SECTION 6: MINORITY POPULATION, UNEMPLOYMENT, AND LABOR FORCE (FACTORS 1 - 3)

This section provides definitions of minorities considered for availability analysis. A discussion of minority population, unemployment and labor force with the statistics to be used for these factors is also included. For Asian Americans and American Indians, statistics were projected due to a lack of current data. The methodology for these projections appear in Appendix A2.

6.1 MINORITY IDENTIFICATION

The term "minority" refers to the number of persons sharing common characteristics, traits and customs whose total number comprises a smaller portion of the total population. For the purpose of this study, the term minority refers to Blacks, American Indians, Asian Americans and persons of Spanish Origin.

6.1.1 Blacks. The category Black, is a racial group that includes persons classifying themselves as Negroes, as well as persons identifying themselves as Jamaican, Trinidadian, West Indian, Haitian or any other member of the Black African racial group.

6.1.2 Spanish Origin. Persons of Spanish Origin constitute an ethnic group rather than a race, since 98% of the persons that identify themselves as Spanish Origin are white. Persons of Spanish origin can actually be identified with the white or black race.

There is some difficulty in identifying the Spanish Origin population, because of the various methods used for identification and various terms used to refer to persons of Spanish Origin.

The term "Spanish Origin" has been used throughout this report to identify persons whose origin or descent is Mexican, Puerto Rican, Cuban, Central or South American or any other Spanish heritage.

The census reports on the Spanish population indicate that six different identifiers have been used for census data:

1. Spanish Surname
2. Spanish Language
3. Spanish Origin
4. Spanish Surname or Language
5. Spanish Heritage
6. Birth and/or parentage.

Spanish Language or Surname, Spanish Surname and Spanish Heritage are identifiers that have been used mainly in the five Southwestern States - Arizona, California, Colorado, New Mexico and Texas - because of the large numbers of Spanish Americans in this area. The reason that Spanish Surname has been confined to use in the Southwest only, is that in other parts of the country surnames that are identical to Spanish Surnames can be identified with many other ethnic groups.

Spanish Language is used primarily in the Southwest because in other parts of the U. S., many persons that are classified or identify themselves as of Spanish background, do not have Spanish as a mother tongue.

The use of Spanish Language, Spanish Surname or Spanish Language as an identifier is not considered adequate because they rely not on self identification but on other factors that are not infallible.

Spanish Origin is considered the best census identifier since the classification is based on self identification, and not on language, surname or parentage. The use of the self identification method tends to yield better statistical data for the census on the Spanish population.

NOTE

Spanish Surname Americans (SSA) has been frequently used in the Code of Federal Regulations and in the EEO-1 reporting forms, however the statistics available and used in this study are Spanish Origin data since they are more reliable and complete.

6.1.3 Asian American. The racial group of Asian Americans includes persons of Korean, Japanese, Filipino or Chinese descent or origin. Also included are persons of other Asian descent or origin, excluding persons from the Indian subcontinent.

6.1.4 American Indians. This racial category includes Aleutians, Alaskan Natives and Eskimos, as well as anyone whose self identification classifies them as an American Indian.

6.2 MINORITY POPULATION

The term, "population", is defined for purpose of this report as the number of persons of both sexes and of all ages residing in the United States. "Minority population" therefore is the number of persons of both sexes and all ages who are members of a minority group in the United States.

Table 6.1 provides population statistics for each of the four minority groups for the years 1970 and 1974. The percentage increase from 1970 to 1974 is also shown. It should be noted that minority population has been increasing at a greater rate than total population. For example, Black population has increased 6.68% from 1970 to 1974 whereas total population has increased only 4.27%. In other words, Black population is increasing 1.56 times as fast as total population. This increase causes Blacks to be a larger proportion of the total population in 1974 compared with 1970.

TABLE 6.1 TOTAL AND MINORITY POPULATION

	TOTAL POPULATION	TOTAL MINORITY	BLACK	SPANISH ORIGIN	ASIAN AMERICAN	AMERICAN INDIAN
1970	203,210,158	33,722,967	22,539,362	9,294,509	1,096,366	792,730
%	100.00	16.60	11.09	4.57	0.54	0.40
1974	211,894,000	37,076,903	24,044,000	10,795,000	1,360,943	876,960
%	100.00	17.50	11.35	5.09	0.64	0.41
% increase from 1970 to 1974	4.27	9.95	6.68	16.14	24.13	10.63

Sources: Data based on statistics from Bureau of Census and Department of Labor.

There are three major causes for increases in minority proportions of the population. White population growth rate has been decreasing whereas minority growth rate has been increasing in some cases and in others, maintaining a greater rate of growth than whites. Due to an increase in minority pride as well as shifts from rural to urban areas, identification of minority members has been greatly facilitated. Particularly in the case of Asian Americans immigration has had a major effect on population increases.

6.2.1 Black Population. Blacks comprise 11.35% of the population in 1974 and are the largest of the minority groups. Although Black population growth has been decreasing it still remains higher than the growth rate for the nation as a whole. Their percent increase from 1970 to 1974 was 6.68% for Blacks and 4.27% for the total population. The sex distribution for Blacks for 1974 was 11,452,000 (47.63%) men and 12,592,000 (52.37%) women. The statistic used for Black Population Factor 1 is 24,044,000.

6.2.2 Spanish Origin Population. Spanish Origin persons constitute 4.57% of the total population in 1970 and 5.09% of the total population in 1974. The 1970 census was the first time that persons of Spanish Origin were self identified.

This has perhaps caused some discontinuity in growth rates due to shifts in the populations being identified. The statistic used for Spanish Origin Population Factor 1 is 10,795,000.

6.2.3 Asian American Population. Asian Americans comprise approximately 0.64% of the entire population in 1974. The major contribution to the Asian American population is immigration. Whereas population increased by 36,000 from 1970 to 1974, immigration for the same period was 228,943. (A further discussion of this feature can be found in Section 14: Issues, Asian American Aliens.)

The statistic used for Asian American Population Factor 1 is 1,360,943.

6.2.4 American Indian Population. The difficulty in determining the population size of American Indians is compounded by definition of who is an American Indian; the problems of sampling a population which is spread across the nation and which often lies in areas which do not easily lend themselves to the necessary communication for sampling; volatile changes in mortality, infant death and birth rates among American Indians; tribal identification regulations; and the basic small size of population which requires a large sample to reap a valid and meaningful conclusion. The following table from "A Study of Selected Socio-Economic Characteristics of Ethnic Minorities Based on the 1970 Census, Volume III:

American Indians (July 1974, HEW No. (OS)75-122)" points up the problem.

TABLE 6.2 AMERICAN INDIAN POPULATION: 1900 to 1970

Census Year	American Indian Population	Change from Preceding Census*	
		Number	Percent
1970	792,730	269,139	51.4
1960	523,591	166,092	46.5
1950	357,499	12,247	3.5
1940	345,252	1,900	0.6
1930	343,352	98,915	46.5
1920	244,437	-32,490	-11.7
1910	276,927	39,731	16.8
1900	237,196	-	-

Source: Bureau of the Census, 1970 Census of Population, General Population Characteristics, United States Summary, PC (1)-B1.

(*Changes in the growth of the American Indian population resulted in part from differences in procedures for classifying persons of mixed racial descent.)

The statistic used for American Indian population Factor 1 is 876,960.

6.3 MINORITY UNEMPLOYMENT

The term "unemployment"is defined as those persons sixteen years and older who are not working but who are actively seeking employment. Included are those persons who have never worked, but are seeking as well as those who are not working due to layoffs or waiting to start a new job.

Table 6.3 contains the unemployment force for minorities for 1970 and 1974 and the unemployment rates for 1974. The unemployment rate is derived by dividing the number unemployed by the number in the labor force. For example, the unemployment rate for Blacks in 1974 is derived by dividing the number of Blacks unemployed in 1974, 942,000 (Table 6.3) by the number of Blacks in the labor force in 1974, 9,054,000 (Table 6.4) which results in an unemployment rate of 10.40%.

6.3.1 Black Unemployment. In 1970 the Black unemployment rate was 1.6 times the national average. In 1974 the situation worsened, the Black unemployment for 1974 was almost twice the national average. The statistic used for Black Unemployment Factor 2 is 942,000.

TABLE 6.3 MINORITY UNEMPLOYMENT

	TOTAL	TOTAL MINORITY	BLACKS	SPANISH ORIGIN	ASIAN AMERICAN	AMERICAN INDIAN
1970 Unemployed	4,088,000	896,395	648,802	204,704	17,462	25,427
% Distribution	100.00	21.93	15.85	5.00	0.43	0.62
1974 Unemployed	5,076,000	1,315,814	942,000	308,448	26,404	36,962
% Distribution	100.00	25.92	18.56	6.08	0.52	0.77
Unemployment Rate % 1970	4.94	7.54	8.10	6.43	3.77	11.06
1974	5.58	9.60	10.40	8.10	4.70	14.20

Sources: Data based on statistics from Bureau of Census and Department of Labor.

6.3.2 Spanish Origin Unemployment. Although the unemployment rate among persons of Spanish Origin was lower in 1974 than the Black unemployment rate, 8.10% and 10.40% respectively, the Spanish Origin unemployment rate was almost 1.5 times the national average of 5.58%. The statistic used for Spanish Origin Unemployment Factor 2 is 308,448.

6.3.3 Asian American Unemployment. The unemployment rate among Asian Americans, 4.70%, is lower than national average. One of the reasons for this is that national unemployment rate is the weighted average of unemployment of all job categories. Lower skilled jobs and unskilled workers have higher unemployment than have skilled workers and professionals. Approximately 13.88% of the total labor force is in the Professional category, whereas the percentage of Asian Americans labor force in the Professional category is 27.20%. This would affect the average mean unemployment rate for Asian Americans since the unemployment rate for the Professional category is considerably lower than the national average unemployment rate.

The statistic used for Asian American Unemployment Factor 2 is 26,404.

6.3.4 American Indian Unemployment. American Indians have the highest rate of unemployment among the minorities. In 1974, the American Indian unemployment rate was 14.20% which was 2.39 times the national average. The statistic used for American Indian Unemployment Factor 2 is 38,962.

6.4 MINORITY LABOR FORCE

The labor force is comprised of those persons who are employed and those who are unemployed. Employed persons are defined as those persons, sixteen years and older, who are engaged in paid work either full or part time, and those with jobs who may be temporarily out of work due to illness, vacations, labor disputes, etc. Unemployed persons have been defined in the preceding discussion on Minority Unemployment.

Table 6.4 provides labor force statistics for 1970 and 1974 for each of the minorities, their proportion of the total labor force, and the percent increase from 1970 to 1974. Also included is the labor force participation rate which is defined as the total number in the labor force divided by the total population. For example, to determine the labor force participation rate among Blacks for 1974, the Black labor force statistic for 1974, 9,054,000, is divided by the Black population for 1974, 24,044,000 resulting in a labor force participation rate for Blacks in 1974 of 37.66%.

The statistics used for Minority Labor Force Factor 3 are the 1974 labor force statistics in Table 6.4.

TABLE 6.4 MINORITY LABOR FORCE

	TOTAL POPULATION	TOTAL MINORITY	BLACK	SPANISH ORIGIN	ASIAN AMERICAN	AMERICAN INDIAN
Labor Force 1970	82,715,000	11,883,755	8,009,902	3,180,909	463,074	229,870
% Distribution	100.0	14.37	9.68	3.84	0.559	0.277
Labor Force 1974	91,011,000	13,697,904	9,054,000	3,808,000	561,525	274,379
% Distribution	100.0	15.05	9.95	4.18	0.62	0.300
% Increase 1970 - 1974	10.03%	15.26	13.04	19.71%	21.26%	19.12%
Labor Force Participation Rate %						
1970	40.70	35.24	35.54	34.22	42.24	29.00
1974	42.95	36.94	37.66	35.28	41.26	31.29

Sources: Based on statistics from Bureau of Census and Department of Labor.

SECTION 7: "WOMEN SEEKING EMPLOYMENT," UNEMPLOYMENT, LABOR FORCE (FACTORS 1-3)

This section provides the statistics used for the first three factors for women. Since definitions for labor force and unemployment have been fully presented in the preceding section on minorities they need not be repeated here.

7.1 WOMEN SEEKING EMPLOYMENT

Title 41, Chapter 60-2.11 (b) (2) (v), Code of Federal Regulations, reads "The availability of women seeking employment in the labor or recruitment area of the contractor;...."

One of the difficulties in determining the precise meaning of the above statement; i.e., "women seeking employment" is determining precisely what group this term defines. Generally this term would include women who are unemployed seeking employment and women who are employed seeking different employment. No one could be outside of the labor force and seeking employment because, by the very fact that they are seeking employment, they would be placed in the unemployed category.

At most, considering that all persons if properly compensated would change jobs, the statistic for "women seeking employment" would be the entire labor force. However, it is interesting to note that in recent years, there has been a greater interest on the part of women to enter into the labor force, over and above the normal influx caused by persons graduating from high school and college. Therefore, one factor to be considered in determining the availability of women is "women, not in the labor force, who will be seeking employment in the next twelve months".

In comparison to the statistic for "men not in the labor force who will be seeking employment in the next twelve months", the number of women in this category is considerably larger warranting consideration as a particular factor in determining the availability of women. The following table is for 1974. (Employment and Earnings, October 1975, Vol. 22, #4, Chart A-55).

TABLE 7.1

WOMEN NOT IN LABOR FORCE AND WILL BE SEEKING WORK IN THE NEXT 12 MONTHS. 1974.

	MEN	WOMEN
Never worked	374,000	697,000
Last worked over 5 years ago	99,000	829,000
Last worked 1 to 5 yrs. ago	352,000	1,174,000
Worked during previous 12 mos.	1,552,000	2,563,000
TOTAL:	2,377,000	5 ,263,000

Source: Department of Labor

It is interesting to note that there are 2.2 times as many women in this group as there are men, and excluding those who have worked in the last twelve months the ratio of the number of women to men is 3.3:1. It would seem that this statistic is particularly interesting since normally it would be assumed that the majority of persons in this category would be persons who have worked in the last twelve months and who are in a 16-24 years old category. This is true for men but not for women. (Persons who are not in the labor force who have worked in the last twelve months are for the most part typified by the "seasonal worker" i.e., summer help, Christmas help, etc., and the 16-24 years old category is typified by high school and college graduates and summer help.)

TABLE 7.2
(1974)

WOMEN NOT IN LABOR FORCE AND INTEND TO SEEK WORK IN THE NEXT 12 MONTHS, 1974

		16-24	25-59	60 & Over
Total	Men	1,621,000	552,000	204,000
	Women	2,435,000	2,569,000	259,000
Worked last 12 months				
	Men	1,139,000	306,000	108,000
	Women	1,398,000	1,076,000	88,000
Never worked or last worked over 1 year ago				
	Men	482,000	246,000	96,000
	Women	1,037,000	1,493,000	171,000

(Differences from totals due to rounding)

Source: Department of Labor

Since women who have either never worked or last worked over 1 year ago and are 25 and over totals to 1,664,000 and is almost five times the number of men in these categories it is evident that the use of "Women not in the labor force who will be seeking employment in the next 12 months" as an availability factor is justified.

The statistic used for this factor is:

TOTAL	7,640,000
Women	5,263,000

7.2 WOMEN UNEMPLOYMENT

Women who do not have paid employment and are actively seeking work are considered part of the women unemployment force. There is a greater proportion of women entering the labor force from 1970 to 1974. Also, there is a greater number of women who have been unable to find work. Therefore, it is understandable that the unemployment force for women has increased by 30.0%. By dividing the 6.72% unemployment rate for women by the total unemployment rate of 5.58%, the greater proportion of unemployed women as compared to number of unemployed persons is 1.21.

TABLE 7.3

WOMEN UNEMPLOYMENT

	Unemployment Force		Unemployment Rate	Unemployment Rate
	Total	Women	Total	Women
1970	4,088,000	1,853,000	4.94%	5.88%
%	100.0	45.32		
1974	5,076,000	2,408,000	5.58%	6.72%
%	100.0	47.44		

Source: Department of Labor

7.3 WOMEN LABOR FORCE

Women represent 51.9% of the total United States population, however, the number in the labor force does not reflect their population proportion. In 1974, women comprised only 39.4% of the labor force. However, they increased their proportion in the labor force 3.41% from 1970 to 1974. It is probable that this increase of women in the labor force will continue into the future. The labor force participation rate for women (proportion of the number of women in the labor force to the number of women in the population) showed a 2.37% increase from 1970 to 1974. The increase in the participation rate during this four year period is exclusive of population growth, indicating that a greater proportion of women are participating in the 1974 labor force than in the 1970 labor force.

The statistic used for this factor was 35,825,000.

TABLE 7.4

WOMEN LABOR FORCE

	Total Labor Force	Women Labor Force	Total Labor Force Participation Rate	Women Labor Force Participation Rate
1970	82,715,000	31,520,000	40.70%	30.21%
%	100.0	38.1		
1974	91,011,000	35,825,000	42.95%	32.58%
%	100.0	39.4		
% Increase	10.0	13.7		

SECTION 8: REQUISITE SKILLS FACTOR 4

This section deals with Requisite Skills Factor 4 for both minorities and women. It includes the methodologies for obtaining these statistics as well as the statistics themselves.

The term Requisite Skills means the educational and/or work experience required to qualify for a particular position or job group. The educational requirements for some job groups may simply be a bachelor's degree in the specific discipline, for others it may be an advanced degree and still others, may not even require a degree. In many cases a person working as a technician or assistant may qualify for a professional job group through work experience even without a degree. A few examples may illustrate these points.

Lawyers, Physicians, and Nurses have a specific educational requirement. In the case of Lawyers and Physicians, there is a prescribed course of study beyond the baccalaureate level. In all three cases it is necessary to pass a uniform state examination before a license can be issued and/or an internship required. In the accounting field however, the minimum requirement for certification is approximately 12 college credits in accounting and work experience in an accounting firm for a number of years, before the state certification examination can be taken, and some persons may identify themselves as Accountants without beingcertified.

In the fields of engineering and the sciences, it is possible for an individual to qualify as an engineer or scientist without meeting all of the educational requirements. For example, a Computer Programmer without a bachelor's degree, could after a number of years of work experience qualify as a Systems Engineer. A Chemical Laboratory Assistant or Biology Assistant could qualify as a Biochemist because the person has acquired the requisite skills for that job group through work experience.

The statistic most often used in the past for determining the number of persons with the requisite skills for a particular job group has been the number of persons who are in that job group in the experienced civilian labor force. This statistic is derived from the census which is statistically the largest and most reliable sample in existence. However, it should be noted that there are some drawbacks to the use of experienced civilian labor force as an indicator of the number of persons with skills requisite for a job group.

The fact that the statistics include "experienced" persons points up the fact that "inexperienced" persons who have the skills requirement but have no experience will not be included in this statistic. Second, the civilian labor force does not include an accurate picture of persons available with requisite skills since it is possible that persons who are employed in a particular job group (and are therefore listed as persons in that job group in the civilian labor force and included as being persons having skills requisite for that job group) may meet the job skills requirement necessary for having them placed in pools of available persons for other job groups.

A good example of this would be a woman with a degree in Sociology or Physics who is working as a sales-clerk or secretary. She would not be included among the availability pool for her major skills but rather in sales or secretary job groups. Also, persons who have skills but are not in the labor force are also not included in this figure.

Despite these facts, the experienced civilian labor force is the best available statistic for a base with which to start. Compared to most statistical sources it is highly accurate and informative for determining availability statistics, but it should be remembered that it is a conservative figure. Surely there are more persons who should be included in the factor than the civilian labor force would indicate.

An attempt has been made in this report to alleviate the faults of the statistics for the experienced civilian labor force. Where available, bachelor degree recipients (whose field of study closely aligned itself with the job groups requisite skills) were added to the experienced civilian labor force statistic. For example, in 1970 the experienced civilian labor force in the job group of Chemical Engineer was 54,217 to this was added the number of persons who received a bachelor degree in Chemical Engineering for 1971 through 1974, 14,437. This resulted in the number of persons in 1974 who had skills requisite for the Chemical Engineering job group, 68,654.

It is believed that the addition of bachelor degree recipients from 1971 through 1974 to the 1970 experienced civilian labor force was not only a viable means of updating, but it also provided a more accurate picture of the number of persons who have requisite skills. Where degree data was not available, commonly practical population trend projections were used to update the 1970 statistic to arrive at a 1974 experienced civilian labor force statistic for each of the job groups, and this was used as the Requisite Skill Factor 4.

8.1 PROFESSIONAL CATEGORY

In some instances where job titles (a subdivision of a job group) are not applicable to a specific job group, a recommendation was made to use the Requisit Skill Factor 4 statistics of the general category of "Professionals". These statistics are provided in Table 8.1 which shows the 1970 and 1974 Professional category statistics for women and minorities, percent distribution and percent change from 1970 to 1974.

It should be noted that the increase in Asian Americans is large because of the influx of aliens. Although it is possible to eliminate immigrants from the 1970 to 1974 Asian American figures, it is not possible to distinguish in the 1970 statistics those who were aliens in 1970 and those who are still aliens in 1974 (for a further discussion see Section 14).

The Professional category participation rate is the proportion of the labor force which is in the Professional category divided by the labor force. For example, the Professional category participation rate for women is the proportion of the number of women in the labor force who are in the Professional category divided by the total number of women in the labor force. It should be noted that the high Professional category participation rate for women is due to the high concentration of women in select job groups, i.e., Nursing, Teaching, other than college, and Library Sciences.

TABLE 8.1 PROFESSIONAL CATEGORY

	Total	Women	Total Minority	Blacks	Spanish Origin	Asian Americans	American Indians
1970	11,362,800	4,396,894	980,214	624,744	228,765	104,254	22,451
%	100.00	38.70	8.63	5.50	2.01	0.92	0.20
1974	12,628,454	5,141,096	1,159,052	741,902	237,586	152,766	26,798
%	100.00	40.71	9.18	5.88	1.88	1.21	0.21
Rate Of Change 1970-1974	11.15%	5.19%	18.24%	6.73%	3.86%	46.53%	19.62%

Sources: Based on statistics from Bureau of Census and Department of Labor

Women in these three job groups comprise more than 62% of the women in the Professional category. Table 8.2 includes the Professional participation rates for women and minorities, in 1974 as well as percent increase in the labor force participation rate from 1970 to 1974.

TABLE 8.2 PROFESSIONAL PARTICIPATION RATE

	Total	Women	Total Minority	Blacks	Spanish Origin	Asian American	American Indian
1970 %	13.74	13.95	8.25	7.80	7.19	22.51	9.77
1974 %	13.88	14.35	8.46	8.19	6.24	27.21	9.77
% Change	1.02	2.87	2.56	5.00	(-13.21)	20.88	-0-

Source: Based on statistics from Bureau of Census and Department of Labor.

The unemployment rate for the total Professional category was 2.3% in 1974. The rate for women in the Professional category was 2.9% and for "Blacks and Other" 4.3%. The category "Blacks and Other" includes persons of all races other than white. For purposes of projection, it was assumed that persons of Spanish Origin had approximately the same rate of unemployment in the Professional category, therefore the same rate 4.3% used for "Blacks and Other" was used to obtain unemployment rate of Spanish Origin persons in the Professional category.

(Source of Professional Unemployment Statistics: Social and Economic Status of Black Population in the United States, 1974.)

For Requisite Skills Factor 4 for the Professional Category, the 1974 Professional category labor force statistics, Table 8.1, were used.

8.2 OFFICIALS AND MANAGERS CATEGORY

Statistics used for this category are generally those entitled by Bureau of Census and Department of Labor as "Managers and Administrators, except Farm." Although it may be presumed that this category is contaminated by persons who are not easily interchangeable, a return to EEO-1 regulations definition may be helpful in clarifying this problem.

Officials and Managers -- occupations requiring Administrative personnel who set broad policies, exercise overall responsibility for execution of these policies, and direct individual departments or special phases of a firm's operations. Includes: officials, executives, middle management, purchasing agents and buyers, and kindred workers."

In determining the availability of persons with requisite skills for a particular job category or job group, it is essential to first distinguish precisely what skills are requisite. From the description above it is not possible to determine any particular requisite skills for Officials and Managers. For further aid in this situation an examination of the educational profile of Managers and Administrative personnel in the experienced civilian labor force, 1970 (table 5 from PC-2-7A) will be helpful.

TABLE 8.3: EDUCATIONAL STATUS

OFFICIALS AND MANAGERS

	(1)	(2)	
Managers & Administrators except farm		4 or more years of college	% column (2) over column (1)
Male	5,394,585	1,349,883	25.02%
Female	1,083,601	153,137	14.04%
	6,478,186	1,502,010	23.19%

Recognizing that less than 77% of the Manager and Administrators category have a bachelor's degree and that it would be extremely difficult, if not impossible, to determine if any specific fields of studies are substantially representative in this category, therefore a common sense interpretation of the Manager and Administrator category is necessary.

In the past there have been two major skill developments which are requisite for managerial positions. The oldest based upon the theory of centralizations and seniority prefers that managers rise through the ranks. For example, a manager of an engineering department should be a top engineer, first, and acquire managerial skills, second. The reasoning concludes that an engineering manager who is not an engineer cannot effectively manage an engineering department since he or she would not have the proper perspective of the work performed by his or her department

The second skill requirement is managerial talent. Primarily, this requires the ability to communicate, coordinate, and motivate. The theory of decentralization proposes that it

is not the task of a manager to ride shotgun over those persons whose work he or she manages.

Although this may appear far afield of determining availability statistics, it is not. The principles are as follows:

If managers are extensions of the seniority system and when a person becomes the best in the department,he or she then becomes a manager. The requisite skills statistics to be applied to a particular person in the Officials and Managers category should directly reflect the requisite skill number of the Professional job groups which he manages.

If,however, it is recognized that managerial skills are distinct from the professional skills, i.e., a good engineer does not necessarily make a good engineering department manager, than an understanding of the independence of professional and managerial skills (not totally but substantially) precludes the use of Professional job requisite skill number for the Officials and Managers category.

Considering the availability of management training courses, both industrial and institutional, it is recommended that the availability statistics for the Officials and Managers category be the proportion of women and minorities in the employer's work force. For job groups in the Officials and Managers category the Requisite Skill Factor statistics to be used are the Requisite Skill Factor statistics for the Officials and Managers category, as a whole.

8.3 ENGINEERING

Prior to the discussion of the methodology used to determine the requisite skill factor for Engineering is a profile of those persons in the 1970 labor force who were engineers and their educational status as of 1972. It is hoped that this table will be helpful in understanding the degree of education which is apparently requisite for engineers.

Table 8.3 derived from Bureau of the Census Technical Paper #33 entitled Characteristics of Persons in Engineering and Scientific Occupations: 1972, is readapted to exclude from totals, those who did not respond to the degree level section of their questionnaire. Although, as with any proportion sampling, when the proportion is small the percentage of the sampling error of the proportion estimate is large. However, the purpose of this table is to present a profile of educational trends attained by scientists and engineers and is a good representation as such. Differences from 100% totals constitute the category of "other degrees".

TABLE 8.4:EDUCATIONAL STATUS - ENGINEERING

	No Degree or Associates	Bachelor's	Bachelor's +	Master's	Ph.D.	% with less than Master's
Engineers Total	33.2%	32.5%	17.2%	14.2%	2.2%	82.9%
Chemical Engineers	10.8%	38.8%	22.1%	21.9%	6.0%	71.7%
Civil Engineers	34.3%	36.2%	18.0%	10.3%	0.5%	88.5%
Electrical/ Electronic	31.2%	31.8%	17.8%	16.9%	1.8%	80.8%
Mechanical Engineer	33.7%	34.6%	18.1%	12.2%	1.0%	86.4%
Metallurgical Engineer	23.2%	33.2%	19.9%	16.7%	4.9%	76.3%

Source: Characteristics of Persons in Engineering and Scientific Occupations: 1972, Bureau of Census

Basically the methodology for determining the requisite skills factor is as follows:

First, PC2-7A, Occupational Characteristics, provided the proportion of women and minorities in the experienced civilian labor force, 1970, for each of the job groups discussed. This was used as a base for determining later statistics.

Second, Professional Women and Minorities, Scientific Manpower Commission, provided statistics on number of persons (with proportional distribution for women and minorities) who received bachelor's degrees from 1971 to 1974. These graduates were added to the 1970 experienced civilian labor force to arrive at the requisite skills number for 1974. In cases where degree information for a minority was not available, trend projections were made from existing data.

It should be noted that only bachelor degree data was used for a specific reason. An examination of Summary Reports 1973 and 1974, Doctorate Recipients from United States Universities, National Research Council, National Academy of Sciences, contains statistics on the number of persons who received engineering doctorates, in 1973 and 1974 and the number that had bachelor degrees in the same fields as their doctorates (i.e., engineering). The percentages were for 1973 and 1974, 83.1% and 82.8% respectively. The implication is that the inclusion of doctorate or masters statistics would be repetitious, that is, they would have already been included in the totals when they received their bachelor degrees. In essence there would be contamination due to double counting.

Anotner reason why masters and doctorates were not included is that it was difficult to determine how many persons who were receiving masters and doctorates were already in the labor force working in fields similar to their fields of study. This constitutes another reason why the inclusion of doctorates and masters degree statistics in the determination of Factor 4 would be a source of double counting.

Table 8.4 contains the requisite skills determination for Engineers.

TABLE 8.5:REQUISITE SKILL FACTOR/ENGINEERING

	Total	Women	Total Minority	Black	Spanish Origin	Asian Americans	American Indians
Engineers	1,364,549	23,064	60,795	17,512	20,995	20,988	1,300
%	100.00%	1.69%	4.46%	1.28%	1.54%	1.54%	0.09%
Chemical Engineers	68,654	1,027	2,557	508	840	1,106	103
%	100.00%	1.50%	3.72%	0.74%	1.22%	1.61%	0.15%
Civil Engineers	207,293	2,931	11,962	2,830	4,034	4,638	460
%	100.00%	1.41%	5.77%	1.36%	1.95%	2.23%	0.22%
Electrical Engineers	337,790	5,376	17,149	5,229	4,859	6,808	253
%	100.00%	1.59%	5.08%	1.55%	1.44%	2.02%	0.07%
Mechanical Engineer	218,788	2,034	8,621	2,595	2,765	3,133	128
%	100.00%	0.93%	4.36%	1.18%	1.69%	1.43%	0.06%
Metallurgical Engineers	18,686	164	509	163	201	145	-
%	100,00%	0.88%	2.72%	0.87%	1.08%	0.78%	-

There were insufficient statistics for projecting Nuclear Engineering requisite skills number. The main reason for this is that the Nuclear Engineering population is extremely small. Table 5 of Selected Characteristics of Persons in Fields of Science of Engineering: (1974 Bureau of Census, Current Population Report Special Studies, P-23, No. 53 July, 1975) points out 5,848 of 647,566 Engineers are Nuclear Engineer. Despite the fact that this data is based upon a sample selected in 1970, the proportion of Nuclear Engineers to the Engineers total should be a reasonable estimate. Knowing that the total number of persons with requisite skills for Engineering is 1,364,549 the proportion for Nuclear Engineering would be 12,323. Without going into a lengthy discussion of standard errors of estimates suffice it to say that to estimate that a group has a population of 12,323 is risky enough without trying to determine whether women and/or minorities are 1%, 5% or 10% of Nuclear Engineering total. (Actually this translates into sample proportions of 0.00009, 0.00045, or 0.0009 of the Engineer total.)

Due to a lack of sufficient statistics for the job group of Nuclear Engineering,availability conclusions for total Engineering should be used for the Nuclear Engineering job group.

8.4 MATHEMATICS

The job group, Mathematics, according to the post-censal study of scientists and engineers (Technical Paper #33), had the highest proportion of doctorates and masters of any of the other major scientific and engineering discipline. The following table shows the breakout with percentages of the total in each of the described degree status.

TABLE 8.6:EDUCATIONAL STATUS - MATHEMATICS

	No Degree or Associates	Bachelor's	Bachelor's +	Master's	Ph.D.	Master's or Ph.D.
Mathematics	19.8%	16.3%	11.8%	31.7%	20.4%	52.1%

(Difference from 100.0% is category of "other degrees".)

NOTE:

In the last few years the emphasis on computers and data processing may have caused a shift in either direction between computer specialists and mathematical specialists, that is, discretionary choice of nonability "requirements" which more closely relate to an individual's job or which are preferred by the individual will lead to shifts in the identification by individuals within specific job groups. For example, if five persons are working in a mathematics department, all having the same requisite skills and one individual works as a liaison with the computer center, he may decide to call himself a computer

math specialist because it allows him some independent distinction and it may be an attempt at being more specific concerning his actual job function.

The methodology for arriving at the requisite skills for Factor 4 Mathematics was as follows:

1970 Labor Force statistics from Bureau of Census PC2-7A was used as a base. Bachelors degrees awarded from 1971 to 1974, total and women were extracted from Scientific Manpower Commission, Professional Women & Minorities (Tables PS-M-10 and PS-M-21). The proportions of minorities in the fields of study of mathematics and statistics in all colleges in 1972 was obtained from Table G-E-8, Professional Women and Minorities. Since there is no reason to assume that attrition rates in these majors is any higher for minorities than it is for whites, especially with the emphasis financially and otherwise upon minorities in colleges, the proportion that minorities are of the entire 1972 college student population is the same as their proportions in the degrees earned from 1971 to 1974. Since data for minorities other than Blacks was not available in the 1972 student population, the proportional increase for Blacks in the student populations compared to the 1970 workforce was applied to the other minorities. In other terms, it was assumed reasonable to say that the proportional interrelationship of minorities in the 1972 college population was the same as the 1970 Labor Force.

After proportioning the degree data from 1971 to 1974 into minorities, the degree statistics were added to the 1970 Labor Force statistics to arrive at the Factor 4 for Mathematics.

An example of this methodology with statistics from sources mentioned is:

1970 Labor Force of Asian American Mathematics - 1059

1970 Labor Force of Black Mathematicians - 2418

Blacks comprised 5.43% of the 1972 student population and therefore it is assumed they comprise 5.43% of the total bachelor degrees for 1971 through 1974 in Mathematics(94,488) or 5131 so that the requisite skill number for Blacks is 7549. If we divide the Black 1974 statistic, 7549,by the Black 1970 statistic, 2418,the result is the percentage increase, 312.20%. This multiplied by the Asian American 1970 statistic, 1059,(it is assumed Asian American proportions increase in the same as Blacks) the resulting statistic is 3307.

TABLE 8.7:REQUISITE SKILLS FACTOR/MATHEMATICS

Total	Women	Black	Spanish Origin	Asian American	American Indian	Total Minority
151,417	53,034	7,549	2,323	3,306	390	13,568
100.00%	35.03%	4.99%	1.53%	2.18%	0.26%	8.98%

8.5 CHEMISTRY

Table 8.7 presents the educational attainment of Chemists in the 1972 post censal survey of scientist and engineers. Of all the sciences, Chemistry had the lowest proportion of master's and doctorate's in related occupations.

TABLE 8.8: EDUCATIONAL STATUS - CHEMISTRY

	No Degree or Associates	Bachelor's	Bachelor's +	Master's	Ph.D.	Master's or Ph.D.
Chemistry	19.2%	27.4%	14.5%	15.6%	22.8%	38.4%

(Difference from 100.0% is category of "other degrees".)

The methodology for determining requisite skills number for both women and minorities in the Chemistry job group was similar to the methodology used for Engineering job groups. 1970 Labor Force statistics were derived from Bureau of Census, Occupational Characteristics (PC2-7A). Bachelor degree information was obtained from Scientific Manpower Commission, Professional Women and Minorities (Tables PS-C-1 and PS-C-19) and Scientific Engineering Technical Manpower Comments (Nov. 1975). The latter provided degree data and the former provided statistics for women and minority proportions for 1973 and women data for 1971 and 1972. Proportional methodology was used to fill in unavailable data similar to method discussed in Engineering methodology. Degree data for 1971 to 1974 was added to 1970 Labor Force to arrive at requisite skill numbers for Chemistry.

TABLE 8.9: REQUISITE SKILL FACTOR/CHEMISTRY

Total Population	Women	Total Minorities	Black	Spanish Origin	Asian American	American Indians
169,854	23,244	16,669	6517	3877	5975	300
100.00%	13.68%	9.81%	3.84%	2.28%	3.52%	0.18%

8.6 BIOLOGY

Table 8.9 presents the educational attainment in 1972 of the post-censal survey of scientists and engineers in the job group of biology.

TABLE 8.10: EDUCATIONAL STATUS-BIOLOGY

	No Degree or Associate	Bachelor's	Bachelor's +	Master's	Ph.D.	Master's or Ph.D.
Biology	9.8%	16.3%	12.5%	23.7%	35.2%	58.9%

(Difference from 100.0% is category of "other degrees").

The proportion of persons in the field of Biology with master's or greater education is higher than the statistics for Engineers, and it is higher than most scientists except for Physicists and Mathematicians.

Table 8.10, requisite skills for Biology was derived using the same methodology and sources as was used for Mathematics. For a complete discussion of this methodology see paragraph 8.4, Mathematics.

TABLE 8.11: REQUISITE SKILLS/BIOLOGY

	Total Population	Women	Total Minority	Black	Spanish Origin	Asian American	American Indian
1974 Requisite Skills Factor 4	198,455	58,948	26,762	13,455	5,173	11,794	745
	100.0%	29.70%	13.49%	6.78%	2.61%	5.94%	0.38%

8.7 PHYSICS

The following table shows the level of education achieved by those persons in post-censal survey of scientists and engineers in 1972 for the job group of Physics. Except for Mathematics, the job group of Physics had the highest proportion of master's and doctorates in the survey population.

TABLE 8.12: EDUCATIONAL STATUS-PHYSICS

Physicists	No Degree or Associate	Bachelor's Degrees	Bachelor's +	Master's	Ph.D.	Master's or Ph.D
	7.5%	9.0%	13.5%	27.4%	41.8%	69.2%

(Differences from 100%, due to "to other degrees")

The methodology for determining the requisite skill numbers for Physics is similar to the method used for Mathematics and Biology. It differs slightly in that minorities receiving bachelor degrees in 1974 were available from American Institute of Physics, 1973-74 Survey of Physics Bachelor's Degree Recipients, (AIP Pub. No. R-211,6, Feb. 1975). These proportions were applied to 1971 - 1973 bachelor degree recipients. The total degree recipients from 1971 to 1974 were added to the 1970 Labor Force statistics for Physics to arrive at the requisite skill numbers for Physics.

TABLE 8.13: REQUISITE SKILLS/PHYSICS

	Total Population	Women	Total Minorities	Blacks	Spanish Origin	Asian American	American Indians
1974 Requisite Skills Factor 4	56,516	2,978	3,226	827	849	1,512	38
	100.0%	5.27%	5.71%	1.46%	1.50%	2.68%	0.07%

8.8 ACCOUNTING, COMPUTING/DATA PROCESSING, AND NURSING

For the job groups of Accounting, Computing/Data Processing, and Nursing the same methodology was used for the determining requisite skills numbers for minorities and women. The sources for the data, listed below, are as follows:

1. 1970 Labor Force derived from Bureau of Census, Occupation Characteristics, PC2-7A.
2. 1974 employed in each job group for Total Women, and "Black and Other Races" from Department of Labor, Employment and Earnings, June 1975, (Table A-1).
3. Unemployment statistics for the Professional job category were derived from Bureau of Census, Current Population Report P-23, No. 54, Social and Economic Status of the Black Population in the United States, 1974 (Table 43).

Certain assumptions were made for the projection of requisite skills. (Example shown for Accounting)

1. The unemployment rate for the Professional category would be a reasonable estimate of the unemployment rate for the minorities and women. This in the Accounting, Computer and Data Processing, and Nursing job groups was used in conjunction with employed, 1974 to determine the profile of the 1974 Labor Force.

   Professional Unemployment (UNP) 1974

   Total (UNP/Tot) = 2.3%

   Women (UNP/w) = 2.9%

   Black & others (UNP/bc)= 4.3%

(The classification "Blacks & Others" refers to Blacks and other races, namely Asian Americans and American Indians. Spanish origin persons are not included in this statistic.)

The 1974 Labor Force for a particular job group (LFjg) and the proportion for women (LFjgw) and Blacks and others (LFjgbo) was derived at by using the following formula:
where Ejg = employed in the particular job group.

$$LFjg = \frac{Ejg}{(100.0\% - UNP/Tot)}$$

Example

$$821{,}904 = \frac{803{,}000}{100.0\% - 2.3\%}$$

Labor Force statistics in the particular job group for Women and "Blacks and Others" were derived by using corresponding adaptations of this formula.

$$LFjgw = \frac{Ejgw}{(100.0\% - UnP/w)} \qquad 195{,}995 = \frac{190{,}311}{(100.0\% - 2.9\%)}$$

$$LFjgbo = \frac{Ejgbo}{(100.0\% - UNP/bo)} \qquad 48{,}667 = \frac{46{,}574}{(100.0\% - 4.3\%)}$$

2. The second assumption made was that the proportional distribution for Asian American (aa), American Indians (ai), and Blacks (b) in the 1974 "Blacks and Others" category was the same as the similarly defined statistic from the 1970 Labor Force statistics. The following formula was used to derive 1974 Labor Force statistics for these groups.

1970 LFbo = 1970 LFb + 1970 LFaa + 1970 LFai

(26,040) = (16,590) + (8,777) + (673)

Proportion factor
Blacks (PFb) = $\frac{1970\ LFb}{1970\ LFbo}$ $\frac{16,590}{26,040}$ = 0.6371

Proportion factor
Asian Americans (PFaa) = $\frac{1970\ LFaa}{1970\ LFbo}$ $\frac{8,777}{26,040}$ = 0.3371

Proportion factor
American Indians (PFai)= $\frac{1970\ LFai}{1970\ LFbo}$ $\frac{673}{26,040}$ = 0.0258

These proportion factors when multiplied by the 1974 LFbo produced the corresponding minorities 1974 Labor Force statistic. (Note: 1974 LFbo = LF jgbo, above).

(PFb) (1974 LFbo) = 1974 LFb (0.6371) 48,667 = 31,006

(PFaa) (1974 LFbo) = 1974 LFaa (0.3371) 48,667 = 16,406

(PFai) (1974 LFbo) = 1974 LFai (0.0258) 48,667 = 1,256

3. Since statistics were not available for Spanish Origin (so) persons, the assumption was deemed reasonable that the increase in size of the Spanish Origin segment of any job group was equal to the increase of the corresponding job groups black segment. Therefore the following formula was used:

$$\left(\frac{1974\ LFb}{1970\ LFb}\right) \times 1970\ LFso = 1974\ LFso$$

$$\frac{31,006}{16,590} \times 13,819 = 25,827$$

Table 8.13 contains the requisite skill numbers for Accounting, Computing/Data Processing and Nursing.

TABLE 8.14: REQUISITE SKILLS

	Total	Women	Total Minority	Black	Spanish Origin	Asian American	American Indians
Accounting	821,904	195,995	74,493	31,006	25,827	16,406	1,256
%	100.0%	23.85%	9.06%	3.77%	3.14%	2.00%	0.15%
Computing/ Data Processing	318,321	60,855	23,318	12,730	5,445	4,828	315
%	100.0%	19.12%	7.33%	4.00%	1.71%	1.52%	0.10%
Nursing	925,281	912,379	116,009	80,115	20,604	12,979	2311
%	100.0%	98.61%	12.54%	8.66%	2.23%	1.40%	0.25%

8.9 PHYSICIANS

The following table contains the requisite skill numbers for the job group, Physicians. The methodology used for these statistics is similar to that which was used for Accounting, Computer/Data Processing and Nursing. The sources for data were the same. The difference in methodologies lies in the fact that the unemployment statistic for the Professional job category was considered unsuitable for use with the Physician job group. Since there would be few Physicians unemployed as was the case with Lawyers, it was assumed that the Employed Force was equivalent to the Labor Force within this job group. Therefore the 1974 Labor Force was proportioned in accordance with the methodology used for Accounting, Nursing and Computer/Data Processing in order to arrive at requisite skill numbers for Physicians.

TABLE 8.15: REQUISITE SKILLS/PHYSICIANS

Total Population	Women	Total Minority	Black	Spanish Origin	Asian American	American Indians
346,000	33,908	54,068	12,259	21,198	20,256	355
100.00%	9.80%	15.63%	3.54%	6.13%	5.85%	0.10%

8.10 ECONOMICS, LIBRARY SCIENCES, LEGAL

Determining the requisite skill numbers for Economists, Librarians and Lawyers required the acceptance of certain assumptions as well as the use of information which, although, not immediately relevant does establish ceilings and guidelines. The methodologies are dealt with individually. However due to their similarity they have been grouped together.

8.10.1 Economics

Degree data for 1971 - 1974, total and women, was available. There is no reason to assume a decline in minority proportion of Economists. If anything there will be an increase. However, an estimate of the increase is difficult with existing data. Because of lack of information, the best estimate of the growth proportion of minorities in the job group of Economics is the growth proportion of women in the job group of Economics.

8.10.2 Library Sciences

Sufficient degree data does not exist for Librarians. However the 1974 Employed Librarians total and women, is available and that "Blacks and Others" are less than 15,000 persons. This latter figure establishes a ceiling for "Black and Others" Librarians. The 1970 Labor Force for "Black and Others" was 10,110. The maximum labor force statistic for "Blacks and Others" that would remain under 15,000 employed would be 15,673. (Adding the employed to the projection unemployed using the Professional category unemployment rate.) If this ceiling were reached the increase in "Blacks and Others" would be

less than the increase in women from 1970 to 1974. Since the increase is less, it has been assumed that the 15,673 would be used as a suitable figure for "Black and Others" 1974 labor force proportion of the Librarian job groups. This would be a conservative figure since the degrees earned in the only year for which degree statistics are available (1971 - 1972) were: Bachelor's - 989; Master's - 7,435; Doctorate's - 64 (National Center for Education Statistics, Earned Degrees Conferred 1971 - 1972.) The increase of Spanish Origin persons was assumed to be at the same rate as increase in "Blacks and Others".

8.10.3 Legal

The 1974 employed statistics for total and women Lawyers is available. The "Black and Other" proportion was less than 15,000 persons. Also available was the 1972 college student profile of those majoring in the field of Law for women and minorities. It was assumed that the unemployment rate among Lawyers was low enough that distinctions between employed and labor force was negligible.

The proportion of the increase from 1970 to 1974 in the Lawyer job group which was comprised of women was 14.84%. Women were 17.72% of the 1972 college student population majoring in Law.

The difference in the percentages is assumed due to the fact that by 1974 the persons who were majoring in Law in 1972 has not

yet entered the labor force nor had they completed their studies. Since to be a Lawyer requires more than a bachelor's degree and therefore a longer time frame than four years, it is necessary to make an adjustment in the proportion of minorities in the 1972 college population before applying it to the degree recipients for 1971 through 1974.

The proportion of women in the increase from 1970 to 1974 in the Lawyer job group was 83.75% of the women proportion of the 1972 college student population. It was assumed that the proportion of Blacks in the increase from 1970 to 1974 in the labor force of the, Legal job group should also be 83.75% of the Black proportion of 1972 college students majoring in Law. This latter statistic was available.

Since the proportion for minorities which would constitute the "Other" in "Black and Others", i.e., Asian Americans and American Indians was approximately 1.68% the same method was applied as to Blacks for determining the proportion of the 1970-1974 increase in labor force of Lawyers. The increase was applied in accordance with the ratio of Asian Americans to American Indians in the 1970 labor force. The Spanish Origin proportion was believed to have increased at the same rate as Blacks.

The table on the following page contains the Factor 4 determinations for Economics, Library Science, and Legal job groups.

TABLE 8.16: REQUISITE SKILLS

ECONOMICS

Total Population	Women	Total Minorities	Blacks	Asian Americans	Spanish Origin	American Indians
139,441	15,619	7,070	3,278	1,087	2,509	196
100.0%	11.20%	5.07%	2.35%	0.78%	1.80%	0.14%

LIBRARY SCIENCES

193,449	159,025	18,395	12,827	2,539	3,029	307
100.0%	82.20%	9.50%	6.63%	1.31%	1.57%	0.15%

LEGAL

359,000	25,130	21,998	11,109	1,891	8,435	563
100.0%	7.05%	6.13%	3.09%	0.53%	2.35%	0.16%

8.11 PERSONNEL AND PROCUREMENT

In dealing with the job groups of Personnel and Procurement, the difficulty in establishing requisite skills statistics is defining the skills required to be considered capable of working in either of these two job groups. A profile of the educational attainment of persons comprising the experienced civilian labor force in 1970, (derived from Bureau of Census, Occupational Characteristics, (PC2-7A) showed the following:

TABLE 8.17: YEARS OF COLLEGE COMPLETED

	1-3	4	5 or More	Total in Job Group
Personnel	64,062	75,158	41,103	297,202
Percent Distribution	21.56%	25.29%	13.83%	100.00%
Procurement	30,128	19,769	4,191	127,982
Percent Distribution	23.54%	15.45%	3.27%	100.00%

Keeping in mind the definition of the Professional category defined in EEOC guidelines, "Occupations requiring either college graduation or experience of such kind and amount as to provide a comparable background...", it is very difficult to ascertain the field of study requisite for Personnel if only 39.12% of the 1970 Personnel labor force possessed four or more years of college or for Procurement if only 18.72% of the 1970 labor force had four or more years of college. Although some colleges do provide business courses in retail trade or industrial marketing, the size of the degreed persons in this area compared to the labor force does not warrant that these fields be considered requisite for a position in Procurement. Nor does the existence of labor relations and industrial relations majors establish a

strong guideline for the determination of requisite skills for Personnel.

Therefore due to the educational profile of these two job groups, it is recommended that total labor force proportions be used as the availability conclusion for Personnel and Procurement. This is deemed justifiable, possible and the essence of a good faith effort at establishing a strong affirmative action goal.

TABLE 8.18: AVAILABILITY CONCLUSION FOR PERSONNEL AND PROCUREMENT

Total Population	Women	Total Minority	Black	Spanish Origin	Asian American	American Indian
100.00%	39.36%	15.05%	9.95%	4.18%	0.62%	0.30%

SECTION 9: PROMOTABLE AND TRANSFERABLE MINORITIES AND WOMEN (FACTOR 5)

This section deals with the availability of promotable and transferable minorities and women within the contractors' organizations. Promotions and transfers are internal methods of acquiring personnel for management and upper level positions within a job family for the purpose of enhancing the skill levels of the individual as well as increasing the effectiveness of the organization. These are internal contractor sources and merit some discussion, in comparison with external sources which are inputs for the availability model

The number or percentage of minority or women in a particular job group within the contractors' organization is not consistent from company to company.

However, there are guidelines for promoting minorities and women within a contractors organization. Promotional rates for consideration in affirmative action plans are outlined in ERDA Appendix 4208-A, Annex A, Paragraph F:

"The annual promotion rate usually will be at least as high as the level of participation of the minorities and/or women in the job group within the major organizational unit."

Carried to its logical conclusion, the level of participation of the minorities and/or women in a particular job group should reflect the availability conclusion for that job group. Therefore,

the promotional goal should be the same as the external availability conclusion, and has its consideration for determining availability of minorities and/or women precisely in its direct reflection of the external sources conclusion. This application is distinguished from the external sources since it directs its efforts towards internal resources for the resolution of the underutilization of minorities and/or women.

SECTION 10: MINORITIES AND WOMEN IN TRAINING INSTITUTIONS (FACTOR 6)

Factor 6, "minorities/women in training institutions capable of training them in requisite skills", has been designated a forecasting availability factor.

The reasoning for this is that in any particular time frame, for example, population, labor force, unemployment, women seeking employment (External Availability Factors) and promotable and transferable persons and degree of contractor training (Internal Availability Factors) have immediate impact upon the availability of persons with skills requisite for a particular job. Although persons in training institutions have no immediate effect upon the availability of persons for a particular job for the same year that they are in the training institutions, enrollment data for a particular year will give a rough indication of the increase of minority/women availability for the following four years, depending upon the year of college in which they are enrolled.

Projections for 1975 thru 1977 will be provided in a supplement to this report and future availability will be discussed more fully there.

The following table from Scientific Manpower Commission, Professional Women and Minorities, provides the minority proportion of tne freshman enrollment 1971 - 1973.

TABLE 10.1 FRESHMAN ENROLLMENT 1971 - 1973
(in percent)

	1971		1972		1973	
	Men	Women	Men	Women	Men	Women
White	92.1	90.6	88.4	85.9	89.1	87.9
Black	5.5	7.2	7.6	10.0	7.0	8.6
American Indian	1.0	0.9	1.1	1.2	0.8	1.0
Asian American	0.5	0.4	1.1	1.1	1.2	1.0
Spanish Origin	1.3	1.3	2.2	2.2	1.8	1.6
Other	(1.2)	(1.1)	(1.8)	(1.8)	(1.5)	(1.5)

SECTION 11: CONTRACTOR TRAINING (FACTOR 7)

This section deals with the type and degree of training that a contractor can provide to minorities and women, in order to increase their requisite skills proportion in his workforce, and rectify their underutilization.

There are three major types of training that a contractor can reasonably undertake. They are:

1. On the job training, apprenticeships.
2. In house training, including seminars, workshops, lectures, classes on job related topics, etc.
3. Formal training or education in outside institutions, including colleges and universities, training and vocational schools, correspondence courses, etc.

Underutilization can be viewed from two perspectives. If the minority group or women proportion in a particular job group is less than the availability conclusion the minority group or women are underutilized. If a minority member or a woman has the potential to perform a job requiring a higher skill level or more technical knowledge than the job in which they are currently employed, the minority member or woman is underutilized in commonly used personnel terms.

The training of personnel for the purpose of the realization of full potential is a benefit mutually enjoyed by employer and

employee. Also, an employer should realize that the labor market which surrounds his facility has an abundance of underutilization potential which with training can become a productive asset to the firm.

Although it is not possible to determine a uniform degree of training for all organizations, since the resources available for training vary from company to company, there is one positive approach. Neglecting the discussion of the tremendous advantage of offering education as a form of compensation, both as desirable to the employee and a means of enhancing human resource assets of the company, the proportion of minorities and/or women participating in training programs should reflect the proportion of minorities and/or women in the workforce which should directly reflect the external sources availability conclusions.

SECTION 12: DETERMINATION OF AVAILABILITY CONCLUSION

The purpose of this section is to describe how the availability factors were considered for the determination of an availability conclusion for each job group.

Initially, an attempt was made to fit the data into a regression based model. While several related kinds of studies have employed the regression model, that model was deemed inappropriate in this instance for two major reasons. Firstly, it seems fairly clear that projecting availability based on historical data would tend to perpetuate past discriminatory practices by training institutions and employers. Secondly, even if such a model was deemed appropriate, there did not exist repeated measurements on the base data that is required in the regression based model. Accordingly, an heuristic approach was employed in order to include the factors of size of population, unemployment, labor force, and requisite skills for minorities. In the case of women, the factors included women seeking employment, unemployment, labor force, and requisite skills.

On the other hand, three of the factors were not included in the model. These factors concern:

Factor 5. Promotable and transferable individuals (minorities and women) within the contractor's organization.

Factor 6. Enrollment of minorities and women in institutions capable of training them.

Factor 7. Degree of training which the contractor is reasonably able to undertake.

Factors 5 and 7 are internal to the contractor's organization, Factor 6 is to be used for projective analysis while the other factors are external and are characteristic of the national labor area. Accordingly, it is impossible to incorporate the three aforementioned factors in a mathematical formulation. However, these factors can and should be considered by individual contractors as part of their Affirmative Action programs. It seems most logical to consider Factors 5 and 7 as strategies to achieve Affirmative Action goals, i.e., they may not necessarily influence the goal, but should foster its attainment. Factor 6 on the other hand, can be used to project requisite skill data into future years.

12.1 STATISTICAL MODEL FOR MINORITIES

For minorities, it is still necessary to consider the factors of size of population, unemployment and labor force.

Unemployment and labor force are incorporated into the model by the use of the unemployment rate for minorities (Formula 1) and for the total population (Formula 2).

$$\text{Unemployment rate for minorities} = \frac{\text{Number of unemployed in the minority group}}{\text{Number of the minority in the labor force}} \quad (1)$$

$$\text{Unemployment rate for total population} = \frac{\text{Total unemployed}}{\text{Total labor force}} \quad (2)$$

It can be readily seen that Formula 1 includes both the minority unemployment and labor force factors and that Formula 2 includes both factors of total population and total labor force.

In order to compare the rates of unemployment in minority groups with that of the population at large, an index of relative unemployment is constructed by dividing Formula 1 by Formula 2. Accordingly, we define an Unemployment Ratio as follows:

$$\text{Unemployment Ratio (UR)} = \frac{\text{Unemployment rate minority}}{\text{Unemployment rate total population}} \quad (3)$$

The Unemployment Ratio (UR) is a multiplicative factor, i.e., it indicates how many times larger unemployment is among minority group members than in the population at large.

For minorities, the remaining factor to be considered is that of population. It is clear that the adjustment factor for each minority group needs to account for the relative size of the minority group. Other things being equal, larger minority groups should have a larger adjustment factor. Accordingly, the factor UR-1 is multiplied by the minority population proportions (i.e., the number of minority group members divided by the total population number). The adjustment factor is defined by Formula 4.

$$\text{Adjustment Factor} = (UR-1)\left(\frac{\#\text{ in minority population}}{\text{total population}}\right) \qquad (4)$$

The adjustment factor is multiplied by the requisite skill proportion, i.e., the number of the minority having requisite skills, and the product is added to the requisite skill proportion in order to form the model proportion.

The arithmetic is simplified if 1 is added to the Adjustment Factor and then (AF+1) is multiplied by the requisite skill proportion to form the availability conclusion. If UR=2, then minority unemployment is twice the rate of (or 100% greater than) that of the total population.

It must be borne in mind that when UR=1, minority group unemployment rate equals that of the total population. We can see for example, in Table 12.1 that UR=1.86 for Blacks. This means that unemployment is 86 percent (0.86) greater

among Blacks as compared to the total population. As a result the adjustment factor needs to be corrected by forming the construct UR-1 since we are concerned with deviations of the ratio from equal unemployment rates or the case where UR=1.

The basic unemployment data are shown in Table 12.1

These data yield the following Unemployment Ratios for the designated minority group.

NOTE

In this section rounding was done in the interim formulas for ease of presentation.

TABLE 12.1: UNEMPLOYMENT RATIOS FOR MINORITIES

GROUP	UR	UR-1
Blacks	1.8654	0.8654
Spanish Origin	1.4523	0.4523
Asian Americans	0.8431	--
American Indians	2.5460	1.5460

Since UR for Asian Americans is less than one, there need be no compensatory adjustment to the requisite skill proportion for Asian Americans.

The adjustment factors are presented in Table 12.2.

TABLE 12.2: ADJUSTMENT FACTORS FOR MINORITY GROUPS

GROUP	UR-1	PROPORTION OF POPULATION	ADJUSTMENT FACTOR
Blacks	0.86	0.1135	0.0982
Spanish Origin	0.45	0.0510	0.0230
Asian Americans	--	0.0064	--
American Indians	1.55	0.0041	0.0064

In summary, the availability proportion for minorities is given by the following formula:

$$\text{Model Proportion (minorities)} = \left[(UR-1)\left(\frac{\#\ \text{minority population}}{\text{Total population}}\right)+1\right] \times \text{minority requisite skills proportion}$$

where UR is defined by Formula 3.

or alternatively

$$\text{Model Proportion (minorities)} = (AP + 1) \times \text{minority requisite skills proportion}$$

12.2 DETERMINATION OF AVAILABILITY CONCLUSION FOR MINORITIES

12.2.1 If requisite skills proportion for a minority is greater than or equal to the minority population proportion then requisite skills proportion is the availability conclusion proportion because if this condition is true, by definition, the minority is not underutilized.

12.2.2 However, if requisite skills proportion is less than the minority population proportion then the minority is underutilized and the statistical model is to be applied.

12.2.3 If the unemployment ratio is less than or equal to one, requisite skills proportion is the availability conclusion proportion.

12.2.4 If the unemployment ratio is greater than one and the model proportion is less than or equal to the minority population proportion, the model proportion is the availability conclusion proportion.

12.2.5 If the unemployment ratio is greater than one and the model proportion is greater than the minority population proportion then the minority population proportion is the availability conclusion proportion.

The availability conclusion percentage equals the availability conclusion proportion times 100 . The availability conclusion percentages and an example for the above model appear in Section 13.

12.3 STATISTICAL MODEL FOR WOMEN

In the case of women, two of the factors - unemployment (factor 2) and labor force (factor 3) - are the same as those considered for minorities. However, for minorities, population was included in the model, whereas, the availability of women seeking employment is the factor 1 for women (see Section 7 for a complete discussion of the factors for women.)

As in the case of minorities, the women unemployment rate is defined by Formula 1. Again, this figure is compared to unemployment rate of the total population (see Formula 2). The Unemployment Ratio defined in Formula 3, is formed by comparing the unemployment rate for women to the unemployment rate for total population. The unemployment data shown give rise to an unemployment ratio (UR) of 1.21 for women.

The availability of women seeking employment is included in the model by considering the proportion of women available for work.

$$\text{Proportion of Women Available for Work} = \frac{\text{Women in Labor Force} + \text{Women Seeking Employment}}{\text{Total Labor Force} + \text{Women and Men Seeking Employment}} \qquad (5)$$

When the data on number of women and men seeking employment are combined with the labor force data, Formula 5 yields a figure of 0.4165.

The Adjustment Factor for women (AFW) needs to be proportional to the percentage of women available for work. As a result, the AFW given by Formula 6, is similar in format, to the minority adjustment factor.

$$\text{Adjustment Factor for Women} = (UR-1) \times (\text{Proportion of Women Available for Work}) \quad (6)$$

For the data at hand, AFW is equal to 0.090.

The model proportion for women is given by the following formula.

$$\text{Model Proportion (women)} = \left[(UR-1)\left(\text{Proportion of Women Available for Work}\right)_{+1}\right] \times (\text{Proportion of women with requisite skills})$$

or

$$(AFW+1)(\text{Proportion of women with requisite skills})$$

where AFW is defined in Formula 6, Proportion of Women Available for Work is defined by Formula 5, and UR is defined by Formula 3.

12.4 DETERMINATION OF AVAILABILITY CONCLUSION FOR WOMEN

12.4.1 If requisite skills proportion for women is greater than or equal to the proportion of women available for work, then the requisite skills proportion is the availability conclusion proportion, since if this condition is true women are not underutilized.

12.4.2 However, if requisite skills proportion is less than the proportion of women available for work, then women are underutilized and the statistical model is to be applied.

12.4.3 If the unemployment ratio is less than or equal to one, requisite skills proportion is the availability conclusion proportion.

12.4.4 If the unemployment ratio is greater than one and the model proportion is less than or equal to the proportion of women available for work, the model proportion is the availability conclusion.

12.4.5 If the unemployment ratio is greater than one and the model proportion is greater than the proportion of women available for work, then the proportion of women available for work is the availability conclusion proportion.

The availability conclusion percentage equals the availability conclusion proportion times 100 . The availability conclusion percentage and an example of the above model appear in Section 13.

SECTION 13: AVAILABILITY CONCLUSIONS

The final outcome of this study of statistical data sources, job titles and job groups, statistics for the availability factors, methodologies, and statistical model is to arrive at a nationwide availability conclusion percentage for each job group for each minority and women. These availability conclusions are to be used in developing Affirmative Action goals for fiscal 1977.

Table 13.1 provides the summation of the statistics for the minority population, women seeking employment, minority and women unemployment and minority and women labor force, and requisite skills.

Paragraph 13.1 is and example of how the factors of Table 13.1 for minorities should be applied to the statistical model. This example shows how to arrive at the availability conclusion for Black Mathematicians. Paragraph 13.2 provides an example of Women Physicians and how the model for women is used to obtain that availability conclusion. That example also uses the factors shown in Table 13.1.

Table 13.2 contains the availability conclusion for the nineteen job groups in the Professional category, and the Officials and Managers category.

TABLE 13.1 FACTOR STATISTICS

	TOTAL POPULATION	WOMEN	TOTAL MINORITY	BLACK	TOTAL SPANISH ORIGIN	TOTAL ASIAN AMERICAN	TOTAL AMERICAN INDIAN
Factor 1 Minorities Population	211,894,000		37,076,903	24,044,000	10,795,000	1,360,943	876,960
Factor 2-Women Factor 2-Minorities Unemployment	5,076,000	2,408,000	1,315,814	942,000	308,488	26,404	38,962
Factor 3-Women Factor 3-Minorities Labor Force	91,011,000	35,825,000	13,697,904	9,054,000	3,808,000	561,525	274,379
Factor 1-Women not in Labor Force, Seeking Employment	7,640,000	5,263,000					
Factor 4-Women and Minorities Requisite Skills							
Officials and Managers Category (See Table 13.2)							
Professional Category	12,628,454	5,141,096	1,159,052	741,902	237,586	152,766	26,798
Total Engineers	1,364,549	23,064	60,795	17,512	20,995	20,988	1,300
Chemical Engineers	68,654	1,027	2,557	508	840	1,106	103
Civil Engineers	207,293	2,931	11,962	2,830	4,034	4,638	460
Electrical Engineers	337,790	5,376	17,149	5,229	4,859	6,808	253
Mechanical Engineers	218,788	2,034	8,621	2,595	2,765	3,133	128
Metallurgical Eng.	18,686	164	509	163	201	145	--
Mathematics	151,417	53,034	13,578	7,549	2,323	3,307	390
Chemistry	169,854	23,244	16,669	6,517	4,877	5,975	300
Biology	198,455	58,948	31,167	13,455	5,173	11,794	745
Physics	56,516	2,978	3,226	827	649	1,512	38
Accountants	821,904	195,995	74,493	31,006	25,827	16,406	1,256
Computing	318,321	60,855	23,318	12,730	5,445	4,828	315
Nursing	925,281	912,379	116,009	80,115	20,604	12,979	2,311
Physicians	346,000	33,908	54,068	12,259	21,198	20,256	355
Economists	139,441	15,619	7,070	3,278	2,509	1,087	196
Librarians	193,449	159,025	18,702	12,827	3,029	2,539	307
Legal	359,000	25,130	21,998	11,109	8,435	1,891	563

13.1 EXAMPLE FOR BLACK MATHEMATICIANS

Unemployment Rate For Blacks = $\frac{\text{Unemployed Blacks}}{\text{Black Labor Force}} = \frac{942,000}{9,054,000} = 0.1040424$

Unemployment Rate Total Population = $\frac{\text{Total Enemployed}}{\text{Total Labor Force}} = \frac{5,076,000}{91,011,000} = 0.0557734$

Unemployment Ratio UR = $\frac{\text{Unemployment Rate Blacks}}{\text{Unemployment Rate Total}} = 1.8654484$

Adjustment Factor = $(UR-1)\ \frac{\text{Total Black Population}}{\text{Total Population}}$

$(1.865-1.00)\ \frac{24044,000}{211894000} = (0.865)\ (0.1134718 = 0.0982)$

Requisite Skill Proportion Black Mathematicians = $\frac{\text{Number Black Mathematicians}}{\text{Total Mathematicians}}$

$= \frac{7549}{151,417} = 0.0499$

Availability Conclusion = (AF+1) (Requisite Skills Proportion) Black Mathematicians

$= (1.098)\ (0.0499) = 0.0548$

Availability Conclusion Black Mathematicians

$0.0548 \times 100 = 5.48\%$

13.2 EXAMPLE FOR WOMEN PHYSICIANS

$$\frac{\text{Proportion of Women}}{\text{Available for Work}} = \frac{\text{Women in Labor Force}}{\text{Total Labor Force}} + \frac{\text{Women Seeking Employment}}{\text{Women \& Men Seeking Employment}}$$

$$= \frac{35,825,000}{91,011,000} + \frac{5,263,000}{7,640,000} = \frac{41,088,000}{98,651,000} = 0.4165$$

$$\text{Unemployment Ratio Women} = \frac{\text{Unemployment Rate Women}}{\text{Unemployment of Total Population}}$$

$$= \left(\frac{2,408,000}{35,825,000}\right) \div \left(\frac{5,076,000}{91,011,000}\right) = \frac{.0672}{.0558} = 1.21$$

$$\text{Adjustment Factor Women (AFW)} = (UR-1) \times \text{Proportion of Women Available for Work}$$

$$= (1.21 - 1)(0.4165) = 0.087$$

$$\text{Requisite Skills Proportion for Women Physicians} = \frac{\text{Women Physicians}}{\text{Total Physicians}} = \frac{33,908}{346,000} = 0.098$$

$$\text{Availability Conclusion} = (AFW+1) \times (\text{Proportion Requisite Skills})$$

$$= 1.087 \times 0.098 = 0.1066 \times 100.0 = 10.66\%$$

TABLE 13.2: AVAILABILITY CONCLUSIONS - WOMEN AND MINORITIES BY JOB GROUPS (IN PERCENT)

	WOMEN	TOTAL MINORITY	BLACK	SPANISH ORIGIN	ASIAN AMERICAN a	AMERICAN INDIAN b
Professional Category	41.65	9.78	6.45	1.92	1.20	0.21
Officials and Managers	(Use workforce proportion for availability conclusions)					
Total Engineering	1.84	4.63	1.41	1.58	1.54	0.10
Chemical Engineering	1.63	3.82	0.80	1.25	1.61	0.15
Civil Engineering	1.53	5.95	1.49	1.99	2.24	0.22
Electrical Engineering	1.73	5.26	1.69	1.47	2.02	0.08
Mechanical Engineering	1.01	4.09	1.30	1.29	1.43	0.06
Metallurgical Engineering	0.96	2.84	0.96	1.10	0.78	0.00
Mathematics	38.08	9.49	5.48	1.57	2.18	0.26
Chemistry	14.88	10.23	4.21	2.31	3.52	0.18
Biology	32.30	16.43	7.44	2.67	5.94	0.38
Physics	5.73	5.88	1.60	1.53	2.68	0.07
Accounting	25.93	9.50	4.14	3.21	2.00	0.15
Computing	20.79	7.76	4.38	1.75	1.52	0.10
Nursing	98.61 c	13.44	9.50	2.28	1.40	0.25
Physicians	10.66	15.97	3.89	6.13 d	5.85	0.10
Library Science	82.21 c	10.36	7.28	1.61	1.31	0.16
Economics	12.18	5.34	2.58	1.84	0.78	0.14
Legal	7.61	6.47	3.39	2.39	0.53	0.16
Personnel e	39.36	15.05	9.95	4.18	0.62	0.30
Procurement e	39.36	15.05	9.95	4.18	0.62	0.30

a - Availability Conclusions for Asian Americans correspond to the requisite skill conclusions since the Unemployment Ratio is less than 1.

b - Availability conclusions for American Indians correspond to the requisite skill conclusions since the Adjustment Factor is too small to have a discernible effect.

c - Availability conclusion corresponds to the requisite skill conclusion since the latter is greater than the proportion of women available for work.

d - Availability conclusion corresponds to the requisite skill conclusion since the latter is greater than the proportion of the population.

e - Labor force proportions see paragraph 8.11

SECTION 14: ISSUES

This section discusses some of the major areas which caused some problems or require further explanation.

These issues are dealt with in a manner that proposes a recommendation in keeping with the essential goals of affirmative action. The following issues are discussed:

14.1 Professional and Technical Category Statistics

14.2 Asian American Aliens

14.3 Alternate Methods

14.1 PROFESSIONAL AND TECHNICAL CATEGORY STATISTIC FROM THE DEPARTMENT OF LABOR

Description of professional job categories according to Equal Employment Opportunity Commission (Standard Form 100, Employer Information Report EEO-1 (RCS: GAO No. B180541--R007, p.7).

> Professionals -- Occupations requiring either college graduation or experience of such kind and amount as to provide a comparable background includes: Accountants and auditors, airplane pilots and navigators, architects, artists, chemists, designers, dieticians, editors, engineers, lawyers, librarians, mathematicians, natural scientists, physicians social scientists, teachers and kindred workers.

The argument may be raised that since statistics are designed for the Professional category and not for technicians as well, any utilization of the Professional & Technical category used in Department of Labor statistics would contaminate these statistics for Professional job category purposes.

However, the advantage of using this statistic for a Professional job category data is its accessibility. Both the Bureau of Census and Department of Labor use this title. The former uses it in Current Population Reports, notably The Social & Economic Status of the Black Population in the

United States and Persons of Spanish Origin in the United States (both of which were used as source material for this report and are listed in Appendix A1: Bibliography). Department of Labor uses the Professional and Technical Category statistic in its contributions to the annual Manpower Report of the President and annually in the Department of Labor, Employment and Earnings.

The arguments appear to be balanced. However, after investigation, those job groups which are listed as technicians in Department of Labor Professional and Technical Category - Health Technologists and Technicians, Engineering and Science Technicians, Technicians, except Health, Engineering, and Science," and a proportional amount of technicians in the "All other Professional and Technical category." After analysis of women and minority proportions in these job groups, taking into account their weight in the total Professional and Technical category, and realizing that some jobs may, at the discretion of the employer, be considered professional and not technician jobs and vice-versa since they fulfill the definition quoted above, it has been determined that utilization of the Professional and Technical Category cited in the above sources and similar sources provides suitable statistics for the Professional category.

14.2 ASIAN AMERICAN ALIENS

From 1970 to 1974 the Asian American population increased by 228,943 due to immigration. During that same period those immigrants that would be classified in Department of Labor's category "Professional and Technical workers" amounted to 45,088. This figure is 43.25% of the 1970 Asian American Labor Force.

The question has arisen, what is the effect of other immigrants on minority labor force structure? The following table shows figures for the period 1970 to 1974. The Black immigration was estimated by totaling immigrants from Africa and the West Indies. Spanish Origin immigration are the total of immigrants from Mexico, Central and South America. The percent statistics which follow the numbers are the percentage that immigrants are of the corresponding minority population statistic (i.e., Black Immigrant Professional and Technical divided by 1970 Black Professional and Technical Category.)

As is evident that the relative effect of immigration on the Black and Spanish Origin population is minimal. Compared to population growth in the United States for the Black population, immigration is less than 20% of the increase from 1970 to 1974. The same statistics from the Spanish Origin population is approximately 23%.

TABLE 14.1: IMMIGRATION COMPARISON

Total	Asian American	Blacks	Spanish Origin
Immigrants Population	228,943	297,061	347,056
% of 1970 Corresponding Population Statistic	20.89%	1.32%	3.73%
Labor Force Immigrants	83,241	132,332	112,690
% of 1970 Corresponding Labor Force Statistic	17.98%	1.65%	3.54%
Professional & Technical Category	45,088	17,457	9,196
% of 1970 Corresponding Category Statistics Professional and Technical	43.25%	2.79%	4.02%

Source: Annual Reports of Immigration and Naturalization, Department of Justice, 1971-1974.

It therefore becomes necessary to make a decision on how Asian American immigrants should be dealth with. There are those who propose extrapolating the immigrant population from all statistics. However, even if this were possible it proposes a very interesting problem.

In the case of determining the future availability of professionals it is a very limited segment which need to be viewed when considering those persons who may acquire skills for a particular Professional job group in the next two or three years. College students comprise this group, generally, and junior and seniors majoring in related fields of study represent, more specifically the source of future availability. However, in the case of an Asian American Professional who hasn't yet acquired his citizenship, a determination statistically of when he will become a citizen is extremely difficult, especially, when it is not requisite for him to be a citizen in order to work in a professional job in the United States. If he is excluded from the minority proportions it is possible in one days time to acquire into the Asian American population an experienced Physicist.

It is recommended that the situation of Asian American Aliens be addressed by agencies responsible for Affirmative Action compliance, due to the possible serious impact they may have on utilization of minorities.

14.3 ALTERNATE METHOD

Many different combinations of the eight factors were considered for the statistical model. Two methods were selected as being the best. The model recommended in this report, Section 12, more closely responded to the factors statistically and more effectively fit the statistical sources available than the alternate method proposed here.

The law of supply and demand has been a well established cornerstone of economics. The comparison of "supply of employees" (availability) "demand of the employers" is analogous to the economic principles. Determining the supply of human resources is facilitated by the census. However, the demand for these resources is more difficult to determine. If the analogy is closely inspected, the supply and demand are joined in a relationship which can be represented by the actual labor market condition, that is, the "demand of employers" is reflected by the employment conditions, i.e., the number of persons employed; the particular fields in which they are employed; the minority group, sex, age, etc., characteristic of the employed. Unemployment is the indicator that the supply is greater than demand, and that the supply is being underutilized.

For the purpose of this model the number of employed persons in a particular job group is considered to be the labor market demand of that job group. When unemployment exists for a job group, the indication is that the number of persons

available with requisite skills for that job group (supply of employees) exceeds the labor market demand of that job group.

It would be nearly impossible to determine the unemployment for a particular job group and yet there appears to be some rationale for using the Professional job category unemployment statistics instead. Undoubtedly there is a certain amount of flexibility among many of the job groups. For instance, some students can effectively change their major in their senior year and supplementary education can provide the skills requirements for a job group to a college graduate. This characteristic of the "supply of employees" allows them to realign themselves to the labor market demands. For example: if the demand for Civil Engineers becomes low, Civil Engineering students can change their field of study to another engineering group that has a higher demand. It is not proposed that this flexibility will allow a medical student to, in one year, become a Physicist. Nevertheless, the overall Professional category statistics would even out the supply and demand situations of the individual job groups.

It is crucial to realize that the unemployment of a minority in the Professional category is directly an indication of their underutilization.

With these concepts in mind the statistics for the model to determine availability of minorities aligns with the factors

thus:

Pop = Minority Population (Factor 1)

Un = Unemployment (Factor 2)(See Note)

LF = Labor Force (Factor 3)

RS = Requisite Skills (Factor 4)

NOTE

The minority unemployment rate for the Professional category which is derived by dividing the number of unemployed Professional minorities by the number in the labor force of Professional minorities, has been used as an adaption of Factor 3 for the rationale discussed above. The symbol used for this statistic is Un Pr minority.

The labor market demand for minorities in a particular job group (LMD minority/job group) is determined by:

$$\text{LMD minority/job group} = \text{LF(job group)} - \left[\text{LF(job group)(UnPr minority)}\right]$$

It is then considered that to determine an initial availability conclusion(IAC)the number of the minority with skills requisite for a particular job group (RS minority/job group) be divided by the labor market demand for minorities in a particular job group (LMD minority/job group).

$$\text{IAC} = \text{(RS minority/job group)} \div \text{(LMD minority/job group)}$$

For the determination of the final availability conclusion (FAC) the labor force participation rate (LFr) for the minority which is the minority's labor force (Factor 2) divided by the

minority's total population (Factor 1) is compared to the initial availability conclusion, the larger proportion is used as the final availability conclusion.

The model for women is similar to the model for minorities. The factor designation for women is:

WS = Women Seeking Employment (who are not in (Factor 1) the labor force)

Un = Unemployment (Factor 2)

LF = Labor Force (Factor 3)

RS = Requisite Skills (Factor 4

The labor market demand for women in a particular job group (LMD women/job group) is determined by:

$$\text{LMD women/job group} = \text{LF job group} - (\text{LF job group}) \times \frac{Un + WS}{LF\ (\text{women}) + WS}$$

This statistic is then used as the denominator for the determination of the final availability conclusion (FAC).

$$FAC = (\text{RS women/job group}) \div (\text{LMD women/job group})$$

This model was deemed insufficient due to lack of consistent data sources.

SECTION 15: JOB GROUP COMPOSITION

One of the phases of this study included a distributional analysis of the job titles and job groups utilized by the GOCO's. This came about during visits to several GOCO's and examinations of several Affirmative Action Programs. Job titles were utilized within job groups in an inconsistent manner among GOCO's. Some degree of uniformity was found to be necessary, hence this phase of the study. Beyond the distributional analysis, suggestions were made, for purposes of reporting only, to classify job titles within specified job groups. It is recognized however that job titles, in many case, were not descriptive enough to assign to a specific job group and the final determination was left to the contractor.

15.1 JOB GROUP AND JOB TITLE ANALYSIS

A job, from a personnel viewpoint, has certain aspects which relate it to other jobs and to persons who are capable of performing that job. A job description arises from the analysis which outlines the particular functions of the job. From a list of job functions, the skills required to perform these functions,are combined into a job requirement. The purpose of the job requirements is to align the person who has the skills necessary to fulfill the requirements with the job.

Since the purpose of job grouping is to combine those job titles which require similar skills, a job title representing the job's requirements is a convenient means of determining which

jobs should be placed in which job groups.

Besides the necessity of Affirmative Action Programs, explanatory job titles and uniformity among their use would greatly facilitate recruiting, hiring and inter-company communications.

For example, the job title Design Engineer does not effectively explain either the job requirements or the job functions of the job to which the title is suppose to relate. Design Engineer/Electronics or Design Engineer/Mechanical might better facilitate an understanding of what the job entails. The Dictionary of Occupational Titles (DOT), a U. S. Department of Labor publication, with the use of its six-digit code can be and has been effective in clarifying this situation. The three digit code which was later added to make a nine-digit job code can relate the general Educational Development and specific Vocational Preparation requirements of a particular job. (For a further explanation of these last three digits see General Educational Development and Specific Vocational Preparation Requirements among Professional, Technical and Managerial Occupations, Office of Research, Equal Employment Opportunity Commission, Research Report No. 30, 1969).

The first of the following two tables 15.1, groups the job titles in accordance with the format established by the GOCO's. Titles which give no indication of a particular discipline or requirement, such as designer, processor, specialist, etc. have been excluded as well as all designations of ranking, junior, senior, assistant, designer I, II etc. The number preceding each

title indicates the number of GOCO's using that title.

The second table, 15.2, groups the job titles in accordance with the Dictionary of Occupational Titles guidelines. It should be noted that no continuity and very little similarities existed in the choice of job titles in Table 15.1. It is recommended that a further analaysis of this situation be done for standardizing the titles using the DOT, in accordance with the regulations stated in Title 41, Chapter 60 - 3.6 para. 4.

TABLE 15.1 DISTRIBUTION OF GOCO JOB TITLES AND JOB GROUPS
(The number preceding each job title is the number of GOCO facilities utilizing such job title.)

Engineers

5 Quality Control
6 Quality Assurance
1 Quality Field Engineer
1 Quality Engineer Specialist
1 Quality Information Equipment Engineer
1 Quality Systems Engineer
2 Standards Engineer
1 Reliability Engineer
1 Product Tester Engineer
1 Specifications Engineer
1 Process Control Engineer
2 Construction Inspection Engineer
1 Inspection Engineer
1 Inspection Process Engineer
1 Process Control Engineer
1 Inspection & Test Planning Eng.
1 Control Engineer
1 Non-destruct Test Engineer
1 Design Specialist
2 Designer
1 Process Design Engineer
1 Design Checker
5 Design Engineer
1 Development Consultant
5 Development Engineer
1 Process Development Engineer
7 Metallurgical Engineer
10 Electrical Engineer
5 Electronic Engineer
7 Nuclear Engineer
8 Civil Engineer
9 Chemical Engineer
11 Mechanical Engineer
2 Field
1 Field Operations Supervisor
1 Field Survey Supervisor
1 Engineering Specialist
1 Engineering Assistant
1 Plant Engraving Assistant
1 Digital Electrical System Eng.
1 Digital Systems Engineer
1 Estimator
1 Fire Protection Engineer
1 Product Analyst
1 Polymer Equipment Dev. Eng.
1 Water Treatment Engineer
1 Alarm Engineer
1 Accelerator Engineer
2 Computer Engineer
2 Architectural Engineer
4 Manufacturing Engineer

Engineers - Continued

3 Plant Engineer	3 Equipment & Tool Engineer
4 Maintenance Engineer	1 Tool Liaison Specialist
1 Program Engineer	1 Tool Design Engineer
2 Process Engineer	1 Tool Engineer
1 Specials Projects Engineer	1 Scheduling Engineer
1 Assembly Engineer	1 Production Scheduling Aide
3 Operations Engineer	1 Contamination Control Specialist
1 Instrument Engineer	1 Safety Programs
3 Industrial Engineer	6 Safety Engineer
1 Estimating Engineer	1 Special Hazards Engineer
1 Welding Engineer	1 Industrial Hygiene Engineer
1 Cryogenic Engineer	1 Sanitary Engineer
1 Power Engineer	1 Environmental Systems Engineer
2 Project Engineer	1 Environmental Support Engineer
2 Production Engineer	2 Health & Safety Engineer
1 Equipment Engineer	1 Reactor Engineer
1 Tunneling Engineer	1 Reactor Operation Engineer
1 Drilling Engineer	1 Reactor Shift Supervisor
1 Communications Engineer	1 Construction Coordinator
1 Facilities Engineer	1 Construction Engineer
1 Systems Engineer	1 Nuclear Matter Management Engineer
1 Structural Engineer	1 Engineering Cost Estimator
1 Methods Engineer	1 Estimating
1 Survey Engineer	1 Engineer Liaison Representative
1 Radiation Engineer	1 Engineering Consultant

Engineers - Continued

1 Research Engineer

1 Business Systems Engineer

1 Management Science Engineer

1 Power Plant Engineer

1 Hot Cells Operations

1 SPr/Pro Engineer

1 Special Comp. Manufacturing

1 Advertising/Manufacturing

1 Vacuum Facilities Planning

Planning & Scheduling

4 Planner
1 Engineer and Science Planner
1 Manufacturing Planner
1 Material Control Planner
1 Production Planner
1 Process Planner
1 Support Services Planner
1 Planning Assistant
1 Planning Coordinator
1 Maintenance Planning Specialist
1 Production Scheduling Analyst
1 Scheduling Analyst
1 Scheduling Engineer

Designers

16 Designer
3 Tool Designer
2 Chief Draftsman
1 Art & Design Assistant

Mathematics

12 Mathematician
1 Applied Mathematician
1 Mathematics Associate
6 Statistician
1 Economist

Chemistry

18 Chemist
6 Analytical Chemist
3 Ceramist
2 Glassblower
2 Physical Chemist
2 Bio Chemist
1 Chemical Associate
1 Developmental Chemist
1 Technological Chemist
1 Isotope Separation Chemist
1 Environmental Protection Chemist
1 Industrial Hygiene Chemist
1 Radiological Chemist

Biology

9 Biologist
5 Ecologist
3 Microbiologist
2 Botanist
2 Environmental Scientist
2 Geneticist
2 Pathologist
2 Veterinarian
2 Physiologist
2 Bio Chemist
2 Geologist
1 Bacteriologist
2 Cytologist
2 Zoologist
1 Cytogeneticist
1 Animal Scientist
1 Horticulturist
1 Plant Biologist
1 Bio Physicist
1 Cell Biologist
1 Environmentalist
1 Oceanographer
1 Microscopist
1 Biology Associate
1 Anatomy
1 Environmental Toxicologist

Biology (Continued)

1 Veterinarian Pathologist
1 Immunologist
1 Bio Math Specialist
1 Bio Stat. Specialist
1 Reproduction Physiologist
1 Prenatal Physiologist

Physics

Physics

14 Physicist
1 Bio Physicist
1 Physics Associate
1 Scientist
2 Research Associate
1 Measure & Standards Physicist
1 Physical Scientist

General Accounting/ Auditing Accountant

25 Accountant	2 Cost Analyst
1 Accountant, Research Facilities	1 Cost & Budget Analyst
1 Accountant, Fuel	2 Accounting Analyst
1 Accountant, Technical & Reactor	1 Auditing Specialist
1 Accountant, Corporate	1 Accounting Specialist
3 Accountant, Property (Specialist)	1 Work Order Analyst
2 Accountant, Payroll	1 Accounting Procedure & Writer
1 Accountant, Critical Materials	1 Procedure Specialist
1 Accountant, Nuclear Materials	1 Nuclear Material Technical Control Administrator
1 Accountant, Tax	
4 Accountant Cost	1 Statistical Assistant
11 Auditor	1 Accounts Payable Examiner
2 Auditor, Internal	1 Accounts Payable & Inventory Control Specialist
1 Property Administrator	
1 Property Coordinator	1 Financial Advisor
6 Budget Analyst	1 Financial Specialist
	1 Project Control Rep.
	1 Personal Accounting Specialist
	1 Cost Improvement Specialist

Financial

1 Internal Auditor
1 Auditor
1 Financial Analyst
1 Budget Analyst
1 Financial Specialist
1 Financial Administrator
1 Economist
1 Nuclear Material Auditor

Data Processing/Computing

12 Programmer
2 Programming Assistant
1 Programming Consultant
1 Scientific Programmer
1 Systems Programmer
1 Computer Programmer, Numerical Control
1 Technical Program Analyst
1 System Data Processing Analyst
10 System Analyst
2 Computer Systems Analyst
1 Analyst MIS
1 Computer Control System Analyst
4 Program Analyst
1 Data Processing Analyst
1 Analyst
1 System & Process Analyst

Data Processing/Computing-cont'd.

1 EDP Project Program/Analyst
1 Computing Specialist
1 Computing Systems Specialist
1 Computing Application Specialist
1 Division System Specialist
1 Computer Scientist
1 Data Processing Coordinator
2 Systems Designer
1 Time Saving Specialist

Nurses

1 Industrial Nurse
1 Occupational Health Nurse
8 Nurse

Physician

5 Physician
2 Medical Director
2 Plant Physician
1 Doctor
1 Pharmacist
1 Staff Psychologist
1 Occupational Physicians

Library Scientist/Librarian

12 Librarian
1 Library and Communication Spec
1 Special Librarian
4 Technical Librarian

Legal

6 Attorney

4 Legal Counsel

1 Legal Associate

1 Legal Advisor

1 Patent Analysis Specialist

1 Subcontract Coordinator and Attorney

Personnel

6 Personnel Administrator

4 Personnel Assistant

5 Personnel Representative

3 Personnel Specialist

1 Personnel Service Supervisor

1 Union Relations Representative

3 Labor Relations

2 Industrial Relations Representative

3 Industrial Relations Specialist

1 Professional Relations Specialist

1 University Relations Representative

3 Public Relations Representative

1 Community Relations Programs Specialist

2 Employee Relations Representative

3 Employment Specialist

2 Employment Representative

1 Employment Supervisor

1 Employment Counselor

Personnel - Continued

1 Professional Placement Representative

1 Employment Interviewer

1 Wage & Salary Administrator

1 Salary Analyst

1 Personnel & Security Specialist

1 Employee & Plant Safety Specialist

2 Physical Security

2 Personnel Security

2 EEO Officer

1 Coordinator Women Programs

1 Idea Planning Counselor

1 Methods & Procedure Analyst

1 Housing Counselor

1 Employee Store Specialist

1 Environmental Protection Specialist

1 Employee Development Specialist

1 Management Development Specialist

1 Manpower Utility Specialist

1 Industrial Engineering Representative

1 Recreational Specialist

1 Editor, Employee Publications

1 Publication Editor

1 Technical Librarian

1 Economic Analyst

Personnel - Continued

2 Public Information Specialist
1 Public Communications Specialist
3 Public Information Officer
2 Training Specialist
1 Radiological Training Coordinator
1 Training Procedure Specialist
1 Training Coordinator
1 Emergency Training Specialist
2 Training Supervisor
1 Manufacturing Operations Training Officer
1 Security Education Specialist
1 Technical Training Specialist
2 Training Representative
1 Training & Certification Specialist
1 Medical Training Representative
1 Compensation Specialist
1 Compensation & Benefits Analyst
4 Compensation Representative
1 Employee Benefit Representative
1 Technical & Communications Security Specialist
1 Security Specialist

Editor

11 Editor
4 Technical Editor
1 Editor/Atomic
1 Science Translator
1 Translator
1 Publications Writer

Procurement

1 Purchasing Contracts Manager
2 Contract Administrator
1 Contract Business Coordinator
1 Contract Buyer
1 Contract Term Officer
1 Construction Contract Spec.
1 Sub Contract Administrator
21 Buyer
1 Specialty Buyer

2 Traffic Agent
3 Traffic Administration Spec.
1 Standards Inspector
2 Specifications Engineer
1 Specifications Coordinator
1 Specifications Writer
1 Specifications Analyst
1 Materials Specifications Coordinator

1 Procurement Specialist
1 Procurement Representative
1 Project Procurement Coordinator
1 Cost Evaluation & Procurement Specialist

1 Procurement Engineer
3 Purchasing Agent
2 Purchasing Administrator
1 (Purchasing Contracts Mgr.)
1 (Assistant Purchasing Mgr.)
1 Purchasing Systems Analyst
1 Construction Inspector
1 Construction Administrator
1 Senior Material Control Agent
1 Materials Specialist
1 (Materials Specification Coord.)
3 Property Specialist
3 Expeditor
1 Field Auditor
1 Manufacturing Representative
1 Shops Fabrication Assistant
1 Shipping Supervisor
1 Field Supply Coordinator
1 Structural Agent
1 Budget Assistant
1 Scheduler/Planner
1 Control Administration Spec.

Miscellaneous

1 Respirator Training Specialist	1 Precision Graphics Analyst
1 Tool Equipment Specialist	1 Pilot
2 Tool Coordinator	1 Air Traffic Controller
1 Tool Estimator	2 Dispatcher
1 Tool & Equipment Development	1 Chief Surveyor
1 Machine Tool Specialist	1 Methods & Work Analyst
1 Instrumentation Specialist	1 Methods & Work Measurement
1 Computer & Data Equipment Spec.	1 Procedure Analyst
1 Equipment Operations Specialist	1 Methods Analyst
1 Instrumentation Generator Coord.	1 Quality Analyst
1 Graphic Arts Specialist	4 Quality Assurance Specialist
1 Police	1 Technical Information Assistant
1 Photographer	1 Documentation Specialist
1 Glassblower	7 Technical Workers
1 Curator	1 Telecommunications Specialist
1 Illustrator	1 Communications Specialist
1 X-Ray Technicians	1 Classification Officer
1 Metallographer	1 Information Center Specialist
1 Writer/Director/Producer	1 Manual Writer
1 Landlord	1 Reactor Operator
1 Locksmith	1 Power Reactor Operator
1 Motion Picture Specialist	1 Power Reactor Engineer
1 Welding Specialist	1 Reactor Operations Representative
1 Electronic Microscopist	1 Nuclear Plant Operations Spec.

Miscellaneous - Continued

1 Reactor Safety Dynamics Analyst

1 Deactivated Plant Surveillance Specialist

1 Deactivated Property Control Spec.

1 Nuclear Materials Management Spec.

1 Maintenance Control Specialist

1 Facility Specialist

1 Maintenance Scheduler

1 Craft Training Representative

1 Meteorologist

1 Geologist

1 Architect

1 Expeditor

3 Estimator

1 Inspector

1 Procedure & Records Management Coordinator

1 Systems Analyst

1 Spare Parts Analyst

1 Material Administrator

1 Materials Control Specialist

1 General Services Asst.

1 Travel & Housing Asst.

1 Radiological Services Coordinator

1 Contract Administration Specialist

1 Field Inspector

1 Assembly Specialist

1 Chemical Specialist

1 Outside Fabrication Coordinator

1 Critical Path Analyst

1 Production Coordinator

2 Business Systems Analyst

2 System & Process Analyst

1 Fuel Maintenance Systems Analyst

1 Fuel Planning & Acct. Analyst

1 Maintenance Planning Analyst

1 Operations Planning Analyst

15.2 SUGGESTED JOB TITLE GROUPING

Table 15.2, following, is based on the Dictionary of Occupational Titles guidelines and places the job titles in recommended job groups. The Dictionary of Occupational Titles uses the terms "job category", "job division," and "Job group" to describe the segmentation of job titles. A job category is a broader classification of the job titles. The job categories are Professionals, and Officials and Managers. The job titles considered for realignment here are only those which fall into the category of Professional. A job division contains a number of job groups and is itself a segment of a job category. An example would be:

Job Category	-	Professionals
Job Division	-	Engineering
Job Group	-	Electrical Engineer
Job Title	-	Digital Systems Engineer

For this study, the job division classification is not used and Engineering is considered as a general job group.

It is suggested that each of the job titles be placed into the recommended job group or job category. If the contractor believes these titles are better placed in another group it should by all means be done. It should however be remembered that although job title - job group alignment is a selection and somewhat arbitrary task, consistency and uniformity are required.

TABLE 15.2: SUGGESTED JOB TITLE GROUPING

CHEMICAL ENGINEERING JOB GROUP

Chemical Engineer
Contamination Control Specialist

CIVIL ENGINEERING JOB GROUP

Civil Engineer
Tunneling Engineer
Structural Engineer
Survey Engineer
Sanitary Engineer
Construction Coordinator
Construction Engineer

ELECTRICAL & ELECTRONIC ENGINEERING JOB GROUP

Electrical Engineer
Electronic Engineer
Digital Electrical System Engineer
Digital Systems Engineer
Communications Engineer
Telecommunications Specialist

MECHANICAL ENGINEERING JOB GROUP

Mechanical Engineer

METALLURGICAL ENGINEERING JOB GROUP

Metallurgical Engineer
Welding Engineer
Metallographer

NUCLEAR ENGINEERING JOB GROUP

Nuclear Engineer
Radiation Engineer
Reactor Engineer
Reactor Operations Engineer
Reactor Shift Supervisor
Nuclear Matter Management Engineer
Hot Cells Engineer
Accelerator Engineer
Reactor Operator
Power Reactor Operator
Power Reactor Engineer
Reactor Operations Representative
Nuclear Plant Operations Specialist
Reactor Safety Dynamics Analyst
Deactivator, Plant Surveillance Specialist
Deactivator, Property Control Specialist
Nuclear Materials Management Specialist

For lack of information concerning job duties, skills and educational requirements,the following engineers have not been placed with a specific engineering discipline job group. If the contractor can place such titles within a specific engineering job group this should be done, otherwise such titles can be placed into the general engineering job group and the appropriate statistics used.

ENGINEERING JOB GROUP

Standards Engineer

Specifications, Engineer
Process Development Engineer
Construction Inspection Engineer
Inspection Engineer
Inspection Process Engineer
Process Control Engineer
Inspection and Test Planning Engineer
Control Engineer
Non destruct Testing Engineer

Process design Engineer
Design Checker

Development Consultant Engineer
Developmental Engineer
Field Engineer
Engineering Specialist
Engineering Assistant
Plant Engraving Assistant
Product Analyst
Polymer Equipment Development Engineer
Estimator
Water Treatment Engineer
Fire Protection Engineer
Alarm Engineer
Maintenance Engineer
Planner
Engineer & Science Planner
Manufacturing Planner
Material Control Planner
Production Planner
Process Planner
Support Services Planner

Planning Assistant
Planning Coordinator

ENGINEERING JOB GROUP - Continued

Maintenance Planning Specialist
Production Scheduling Analyst
Scheduling Analyst
Scheduling Engineer

Quality Analyst
Quality Assurance Specialist
Procedure Analyst
Methods Analyst
Methods & Work Analyst
Methods & Work Measurement

Facilities Specialist

Program Engineer
Process Engineer
Special Projects Engineer
Assembly Engineer
Operations Engineer
Estimating Engineer
Cryogenic Engineer
Drilling Engineer
Engineering Cost Estimator
Engineering Consultant
Research Engineer
Power Plant Engineer
Vacuum Facilities Planning Engineer
Business Systems Engineer
Management Science Engineer
Engineer Liaison Representative

Methods Engineer
Scheduling Engineer
Production Scheduling Aide
Safety Programs Engineer
Safety Engineer
Special Hazards Engineer
Industrial Hygiene Engineer
Employee and Plant Safety Specialist
Health and Safety Engineer

Draftsman
Surveyor

Architectural Engineer
Tool Liaison Specialist
Industrial Engineer
Instrument Engineer
Computer Engineer
Production Engineer
Facilities Engineer
Systems Engineer

Quality Control Engineer
Quality Assurance Engineer
Quality Field Engineer
Quality Engineer Specialist
Quality Information Equipment Engineer
Quality Systems Engineer
Reliability Engineer
Product Tester Engineer
Design Engineer
Design Specialist
Designer
Plant Engineer
Power Engineer
Project Engineer
Equipment Engineer
Tool Equipment Specialist
Tool Coordinator
Tool Estimator
Tool and Equipment Development Engineer
Machine Tool Specialist
Equipment and Tool Engineer
Tool Liaison Specialist
Tool Design Engineer
Tool Engineer
Tool Designer
Environmental Systems Engineer
Enviromental Support Engineer

Instrumentation Specialist
Outside Fabrication Coordinator
Production Coordinator

Equipment Operations Specialist

Instrumentation Generator Coordinator

Maintenance Control Specialist
Facilities Specialist
Maintenance

Fuel Maintenance Systems Analyst
Fuel Planning & Acct. Analyst

Maintenance Planning Analyst
Operations Planning Analyst
Spare Parts Analyst

MATHEMATICS JOB GROUP

Bio Mathematics Specialist
Bio Statistics Specialist
Economic Analyst
Mathematician
Applied Mathematician
Mathematics Associate
Statisticians

CHEMISTRY JOB GROUP

Chemist
Analytical Chemist
Physical Chemist
Chemical Associate
Developmental Chemist
Isotope Separation Chemist
Industrial Hygiene Chemist
Radiological Chemist
Chemical Specialist

BIOLOGY JOB GROUP

Biologist
BioChemist
BioPhysicist
Cell Biologist
Botanist
Plant Physiologist
Plant Biologist
Horticulturalist
Zoologist
Animal Scientist
Microbiologist
Ecologist
Environmental Scientist
Environmentalist
Anatomist
Physiologist
Reproduction Physiologist
Prenatal Physiologist
Geneticist
Cytologist
Cytogeneticist

Bacteriologist
Immunologist

PHYSICS JOB GROUP

Physicist
Physics Associate
Physicist, Measure and Standards
Physical Scientist

ACCOUNTING JOB GROUP

Accountant
Accountant, Research Facilities
Accountant, Fuel
Accountant, Technical and Reactor
Accountant, Corporate
Accountant, Property (Specialist)
Accountant, Payroll
Accountant, Critical Materials
Accountant, Nuclear Materials
Accountant, Tax
Accountant, Cost
Accounting Specialist
Accounts Payable Examiner
Accounts Payable and Inventory Control Specialist
Property Administrator
Property Coordinator
Budget Analyst
Cost Analyst
Cost and Budget Analyst
Budget Assistant
Auditor
Auditor, Internal
Auditing Specialist
Auditor, Nuclear Material
Auditor, Field
Estimator
Accounting Analyst
Work Order Analyst
Accounting Procedure Writer
Procedure Specialist
Cost Improvement Specialist
Nuclear Material Technical Control Administrator
Project Control Representative
Procedure and Records Management Coordinator

NOTE

Financial has been placed in the Accounting Field with the assumption that these persons primarily have Accounting background. If however, their tasks are more akin to the professional designation of Financial Analyst, i.e., investment opportunity analysis, portfolio analysis, risk analysis and methods of capital and debt funding, the persons fulfilling this latter function should be placed in the Mathematics job group.

Financial Specialist
Financial Administrator
Financial Advisor
Financial Analyst

DATA PROCESSING/COMPUTING JOB GROUP

Programmer
Programming Assistant
Programming Consultant
Scientific Programmer
Systems Programmer
Computer Programmer, Numerical Control
Technical Program Analyst
Systems Analyst
Computer Science Analyst
Analyst MIS
Computer Control Systems Analyst
Program Analyst
Data Processing Analyst
Analyst
System and Process Analyst
EDP Project Programmer/Analyst
Computing Specialist
Computing System Specialist
Computing Applications Specialist
Information Systems Specialists
Division System Specialist
Computer Scientist
Data Processing Coordinator
Systems Designer
Time Sharing Specialist
Computer & Data Equipment Specialist

NURSES JOB GROUP

Nurses
Industrial Nurse
Occupational Health Nurses

PHYSICIANS JOB GROUP

Physicians
Medical Director
Plant Physician
Doctor
Pharmacist
Occupational Physician
Pathologist
Veterinarian
Veterinary Pathologist
Environmental Toxicologist

ECONOMICS JOB GROUP

Economist

LIBRARY SCIENCE JOB GROUP

Librarian
Library and Communications Specialist
Special Librarian
Technical Librarian
Curator

LEGAL JOB GROUP

Lawyers
Attorney
Legal Counselor
Legal Associate
Legal Advisor
Patent Analysis Specialist
Sub Contract Coordinator and Attorney

PERSONNEL JOB GROUP

Communications Specialist
Information Center Specialist
Professional Relations Specialist
University Relations Representative
Public Relations Representative
Community Relations Program Specialist
Public Information Specialist
Public Communications Specialist
Public Information Officer
Classifications Officer
Respirator Training Specialist
Craft Training Representative
Personnel Administrator
Personnel Assistant
Personnel Representative
Personnel Specialist
Personnel Service Supervisor
Employment Specialist
Employment Representative
Employment Supervisor
Employment Counselor

Professional Placement Representative
Employment Interviewer
Wage and Salary Administrator
Salary Analyst
Training Specialist
Radiological Training Coordinator
Training Procedure Specialist
Training Coordinator
Emergency Training Specialist
Training Supervisor
Manufacturing Operations Training Officer
Security Education Specialist
Technical Training Specialist
Training Representative
Training and Certification Specialist
Medical Training Representative
Idea-Plan Counselor
Methods and Procedure Analyst
Employee Store Specialist
Environmental Protection Specialist
Employee Development Specialist
Management Development Specialist
Manpower Utility Specialist
Personnel Accounting Specialist
EEO Officer
Coordinator Women Programs
Union Relations Representative
Labor Relations
Industrial Relations Representative
Industrial Relations Specialist
Employee Relations Representative
Compensation Specialist
Compensation and Benefits Analyst
Compensation Representative
Employee-Benefits Representative
Recreational Specialist
Travel and Housing Assistant
General Services Assistant

Technical & Communication Security Specialist
Security Specialist
Personnel & Security Specialist
Physical Security
Personnel Security
Police

NOTE

The following are recommended to be placed in Personnel Job Group. If employer determines that scientific or engineering discipline is a requirement, the option is open to place the job title in the appropriate science or engineering job group.

Editors
Technical Editors
Editor/Atomic
Publications Writer
Technical Information Assistant
Documentation Specialist
Technical Writers
Writer/Director/Producer
Motion Picture Specialist
Manual Writer
Science Translator
Translator
Graphic Arts Specialist
Precision Graphic Specialist
Photographer

PROCUREMENT JOB GROUP

Purchasing Contracts Manager
Contract Administrator
Contract Business Coordinator
Contract Buyer
Contract Term Officer
Construction Contract Specialist
Sub-Contract Administrator
Buyer
Specialty Buyer
Procurement Specialist
Procurement Representative
Project Program Coordinator
Cost Evaluation and Procurement Specialist
Procurement Engineer
Purchasing Agent
Purchasing Administrator
Purchasing Contracts Manager
Purchasing Systems Analyst EDP
Manufacturing Representative
Standards Inspector
Specifications Engineer
Specifications Coordinator
Specification Writer

PROCUREMENT JOB GROUP (Continued)

Specification Analyst
Materials Specifications Coordinator
Construction Administrator
Senior Material Control Agent for Drilling, Mechanical, Electrical, etc.
Shops Fabrication Assistant
Structural Agent
Scheduler/Planner
Control Administration Specialist
Materials Specialist
Material Specification Coordinator
Property Specialist
Expeditor
Materials Administrator
Material Controls Specialist
Contract Administration Specialist

PROFESSIONAL JOB CATEGORY

Geologist
Oceanographer
Meterologist
Psychologist
Social Scientist
Dispatcher
Air Traffic Controller
Pilot
X-Ray Technician
Dietician
Other Med., NEC
Industrial Physicists
Health Physicists
Industrial Hygienist
Hygienist
Occupational Therapist
Physical Therapist
Sanitarian
Medical Assistant
Landlord
Locksmith

APPENDIX A1: BIBLIOGRAPHY

Eighty-two sources are listed in the following bibliography. Of the eighty-two, twenty four sources were actually used. The other fifty-eight sources were not used and the reason for their not being used are explained.

In some cases the data was current, reliable and unbiased but lacked detailed statistics for minorities or women. In other cases, where the data was reliable and unbiased and contained both women and minority statistics, it was not used because more current data became available.

The useful data is arranged according to the manner in which it was used:

1) Primary Data - used to establish a base, mainly 1970 census data, and more current data that included 1970 data.

2) Check Data - used as a measure of the reliability of the primary and projection data.

3) Projection Data - used to arrive at Requisite Skills Factor 4 for 1974.

TABLE A1.1 SOURCES USED

I PRIMARY DATA

1. Professional Women and Minorities - A Manpower Data Resource Service. 1975

   Scientific Manpower Commission

   Data on enrollment, graduates and labor force by sex and minority status in various professional fields. Data to 1974 in some categories.

   Publications of the United States Department of Commerce, Bureau of the Census

2. Detailed Characteristics - PC(1)D1, U.S. Summary.
   1970 Census of the Population
   Department of Commerce - Bureau of the Census

   Characteristics of U.S. Population including income, labor force participation by detailed occupation, based on 1970 decennial census.

   Table 189, 190, 294 used.

3. U.S. Department of Commerce/Bureau of the Census, July 1975. P-25/606

   Estimates of the Population of the U.S. to June 1975. Total population figures. 1970-1975

4. Subject Reports: Occupational Characteristics
   Department of Commerce - Bureau of the Census
   PC(2)-7A - 1970 Census of Population

   Subject report on total and minority participation in the labor force, educational attainment of workers. Minority status and Spanish origin of workers.

5. Persons of Spanish Origin in the United States
   Current Population Reports: Population Characteristics
   March 1974: P-20. #280
   Bureau of Census

   Detailed characteristics of persons of Spanish Origin Used for labor force figures for 1974, in broad occupational categories - table 22.

6. Statistical Abstract of the United States - 1974
U.S. Department of Commerce - Bureau of the Census
Condensed form of the U.S. population census

Data used for population figures for total, Blacks and females.

7. The Social and Economic Status of the Black Population in the United States 1974.
U.S. Department of Commerce - Bureau of the Census

Useful for determining participation of Black population in labor force, total Black population and unemployment rates.

Publications of the United States.
Department of Health, Education, and Welfare

8. Avai: bility Data - Minorities and Women June 1973.
U.S. Department of Health, Education and Welfare
Office for Civil Rights

Lists sources for obtaining availability data - Association, Foundation Reports and Government Publications. Statistics that are included are based on 1970 and earlier data. June 1973.

9. Manual for Determining the Labor Market Availability of Women and Minorities.
U. S. Department of HEW, Office for Civil Rights.

List of studies and publications with data on minorites and women and guidelines for determination of availability of statistics.

Publications of the United States Department of Labor
Manpower Administration.

U.S. Department of Labor - Manpower Administration

10. Dictionary of Occupational Titles 1965 - Volume 1.

Definition of job titles by general characteristics Volume 1.

11. Dictionary of Occupational Titles, 1965.
Volume 2.

Occupations organized by general characteristics and into specific job groups.

SOURCES USED

12. Manpower Report - Message from the President of the United States, 1975. U.S. Department of Labor - 94th Congress, 1st Session House Document No. 94-111.

    Detailed data on employment/unemployment of the population by age, sex, race and occupational group up to 1974. Tables A15, A16, used.

II CHECK DATA

13. Publications of the National Research Council.

    Summary Report of 1969, 1970,1971,1972,1973,1974 Doctorate Recipients from the United States Universities 1970, 1971,1972,193,1974,1975

    Some useful statistics for estimating number of Ph.D. graduates, by race and sex in disciplines.

III PROJECTION DATA

14. American Institute of Physics
    1973-1974 Survey of Physics Bachelor's Degree Recipients.

    Survey by physics institute on profile of physics graduates by race, age, sex. Used for minority and female figures for degrees.

15. Scientific, Engineering, Technical: Manpower Commission
    Volume 12, No. 9 November, 1975.
    Scientific Manpower Commission - update to study of 1975.

    Various articles concerning minorities and women in the science and engineering fields.
    Enrollment and changes in enrollment 1970-1974.
    List publications of interest.

    Used for projections, Chemistry and Chemical Engineering graduates, P.9.

16. Characteristics of the Japanese, Chinese and Filipinos in the United States. 1970 PC(2)-19
    U.S. Department of Commerce - Bureau of the Census

SOURCES USED

Economic characteristics of the Filipino, Japanese, Korean and Chinese population in the United States. Employment Status, labor force, income and class of workers.

Used for Projections of Asian American Population

17. Minorities and Women in the Health Fields
Department of HEW, Bureau of Health Resources Development
May 1974.
Publication # (HRA) 75-22.

Enrollments, graduates and workers in the fields of nursing, medicine, dentistry, etc. to 1975 by race and sex.
Tables 13, 14, 37-40 used.

Study of Socio-Economic Characteristics of Ethnic Minorities Based on the 1970 Census.

18. Volume I - Spanish Origin - used for Projections of Spanisn Origin population, labor force.

19. Volume II - Asian-Americans - used for Labor Force statistics, immigration figures, total population.

20. Volume III - American Indians - used for labor force, population and employment status.

Department of HEW- OS 75 - 120,75 - 121,75 - 122.

21. Employment and Earnings - June 1975
U.S. Department of Labor,Bureau of Labor Statistics

Data on employment by age, sex, detailed occupational group to 1974.

22. Employment and Unemployment in 1974.
Special Labor Force Report 178.
U.S. Department of Labor - Bureau of Labor Statistics 1975.

Data on employed persons by age, sex, and race,
Unemployment by age, sex, race.
Number unemployed intending to seek work and reasons others are not seeking work.
Data on persons planning to seek work within next 12 months used.

23. Annual Report of Immigration and Naturalization,
U.S. Department of Justice. 1971 - 1974

Data on immigrants with labor force profile included.

24. Characteristics of Persons in Engineering and
Scientific Occupations
1972
Technical paper 33
U.S. Department of Commerce - Bureau of the Census

Detailed characteristics of Scientists and Engineers
including labor force, age, highest degree, occupation.
1972 Publication based on resurvey of 1970 population.

TABLE A1.2 SOURCES NOT USED

1. Status of Women Microbiologists
Kuskket, Robbins, Leive, Huang.
February, 1974
American Association for the Advancement of Science

No statistics

2. Women Lawyers: Supplementary Data to the 1971 Lawyer Statistical Report.
Martha Grossblat and Bette H. Sikes
1973
American Bar Foundation.

Statistics not valid due to fact that persons practicing need not be a member of the American Bar Association. Statistics not current.

3. Enrollment of Minority Graduate Students at Ph.D. Granting Institutions - August 1974
Eleane H. El-Khawas and Joan L. Kinzer
Higher Education Panel Reports - American Council on Education. Number 19, August 1974.

Total Minority enrollment and enrollment in broad study areas for Fall 1973.

No graduate figures, no specific disciplines.

4. Minority Enrollment survey 1973.
American Library Association

Ethnic and sexual composition of persons enrolled in Library Science programs.

Survey does not include professional librarians in private or special libraries, institutional or government libraries, incomplete statistics.

5. American Mathematical Society.
Sex, Race and Citizenship of new doctorates. August 1974.

Data on number of doctorate degrees conferred in Mathematics 1973-1974.

Survey of doctorates only.

SOURCES NOT USED

6. MIT - American Physical Society
April 29, 1975.
"Affirmative Action"

Academic plan for affirmative action.
No useable statistics.

Publications from the American Society for Microbiology

7. Salaries of Microbiologists, 1971
Mary Louise Robbins
December, 1972.
American Society for Microbiology.

No useful statistics, data emphasis is on comparison of male and female Salaries.

8. Status of Women Microbiologists
Mary Louise Robbins
April, 1971
American Society for Microbiology

Some statistics regarding highest degree by sex and age.
Figure not valid due to the fact that table is computed by membership. Data is not current.

9. Status of Women Microbiologists
A Further Report, including Preliminary Analysis of reasons for the lower status of Women.
Loretta Leive
August, 1973
Laboratory of Biomedical Pharmacology National Institute of Arthritis and Metabolic diseases
Bethesda, Md. 20014, American Society of Microbiology

No usable statistics.

10. Women in American Microbiology
Peter L. Sguros
1973
American Society for Microbiology

No usable statistics

11. Association of American Colleges
Doctorates awarded to women. April 1972

Project on the status and education of women gives data sources for female doctorates, percentage of female doctorates in selected disciplines.

No statistics.

SOURCES NOT USED

12. Making Affirmative Action Work in Higher Education
1975
Carnegie Foundation

Analysis of affirmative action. Policies for institutes of higher education.

No statistics

13. Engineering Manpower Commission - Engineers Joint Council

Estimates of American Indian, Black, Spanish Surname, Oriental and women engineering students.

Not current

14. Four Minorities and the Ph.D. 1973
Ford Foundation Graduate Fellowships
Ford Foundation, N.Y.

No statistics

15. Minority Access to college
Fred E. Crossland
Ford Foundation Report (1971)

Data based on 1970 representation of minorities in American colleges and universities. No actual survey information.

Data not used because based on 1970 data and earlier data, but not sufficient data to make reliable projections.

Publications from the National Research Council.
National Academy of Sciences

16. Characteristics of Doctoral Scientists and Engineers in the United States: 1973

Employment status of scientists and engineers in 1973, by race, sex, field.

Very few fields of study, no indication of year of graduation.

SOURCES NOT USED

17. Doctoral Scientists and Engineers in the United States
1973 Profile - National Academy of Sciences
National Research Council

Characteristics of scientists and engineers at doctoral level; employment status, field of identification, salaries.

Doctoral fields of study by general field; no minority statistics.

18. Minority Groups Among United States Doctorate Level Scientists, Engineers, and Scholars - 1973
Commission on Human Resources, National Research Council
National Academy of Sciences - December 1974

Data on doctorates awarded to minority group members, in broad educational fields.

Data in broad study groups, not in detailed disciplines.

19. National Research Council - National Academy of Sciences
National Academy of Engineering
Doctorates awarded from 1920-1971: 1973

Doctorates awarded by sub field of doctorate and by sex.

No minority statistics

20. Science Resources Studies Highlights
National Science Foundation
NSF 75-305/75-309/75-306/74-314
April, May, July, September 1975.

Manpower report on persons in science and engineering fields - based on 1970 decennial survey. Reports on population redefinition, changes in employment, characteristics of five science and engineering occupational groups, racial minorities.

Resurvey of 1970 population of scientists/ engineers not a new survey.

21. Professional Women's Groups
American Association of University Women
August 1975

List of women's groups and associations in various disciplines.

SOURCES NOT USED

22. Minorities in Engineering
1974
Planning Commission for Expanding Minority Opportunities in Engineering
(Alfred P. Sloan Foundation)

No useful statistics, insufficient representation of minorities in engineering.

23. Report on Women Undergraduate Engineering,
Society of Women Engineers
Students Biennial Survey 1959-1974
1974

Enrollment of women engineering students by school and field of engineering study.

No minority figures

24. Subject Reports - Industrial Characteristics PC(2) 7B
U.S. Department of Commerce - Bureau of the Census
1970

Detailed characteristics of Industrial Labor Force

No useable statistics

25. Population of the United States
June 1974
Department of Commerce, Social and Economic Statistics Administration, Bureau of the Census

No useable statistics, insufficient representation of minorities, insufficient breakdown into occupational group.

26. Selected Characteristics of Persons in Fields of Science and Engineering
1974
Special Studies P. 23#53
U.S. Department of Commerce - Bureau of the Census

Work activity, labor force, highest degree of Scientists and Engineers.

Resurvey of 1970 scientists and engineers.

SOURCES NOT USED

26. Selected Characteristics of Persons in Fields of Science and Engineering
1974
Special Studies P. 23#53
U.S. Department of Commerce - Bureau of the Census

Work activity, labor force, highest degree of Scientists and Engineers.

Resurvey of 1970 scientists and engineers.

27. The Social and Economic Status of the Black Population in the United States
1973
Current Population Report - P.23, No.48.
Department of Commerce - Bureau of the Census

Data on family, housing, income, labor force participation and population characteristics of Black Americans up to 1973.

Data available to 1974 in the Socio-Economic Status of Black Population 1974.

28. Statistical Abstract of the United States
1972
U.S. Department of Commerce - Bureau of the Census

Condensed form of 1970 census of population and updates material to 1972.

More recent data available in Statistical Abstract 1974.

Publications of the United States Equal Employment Opportunity Commission

29. U.S. Equal Opportunity Commission
Affirmative Action and Equal Employment Volume I, II.
January 1975

General discussion of Affirmative Action and Equal Employment program guidelines.

No statistics

SOURCES NOT USED

30. Changes in Employment Patterns of Minorities & Women
1966-1970
Office of Research - Research Report No. 36
February 1972 (EEOC)

Percent distribution of Blacks, Spanish Origin in the labor force, distribution of females in labor force: 1966 to 1970 figures only

No usable statistics

31. Employment Problems of Women: A Classic Example of Discrimination
1972
Equal Opportunity Commission

Report on problems of working women - labor force participation, occupational group, income and day care

No minority figures

32. General Educational Development and Specific Vocational Preparation Requirements among Professional, Technical and Managerial Occupations.

Reason not used: No usable statistics

Publications of the United States Department of Health, Education and Welfare

33. Earned Bachelor's, Master's, and Doctor's Degrees Conferred on Women
1970-1971
U.S. Department of Health, Education and Welfare - National Center for Education Statistics
1971 earned degrees in broad areas of study for women only.

No minority statistics

34. Digest of Educational Statistics
1974
Department of Health, Education and Welfare
Office of Education NCES 75-210

Detailed statistics for all educational levels. Statistics for some higher education categories 1972, others to 1971.

No minority statistics

SOURCES NOT USED

35. Earned Degrees Conferred, by Level of Degree
Sex
1900-1972
U.S. Department of Health, Education and Welfare,
Office of Education

Total number of bachelor's, master's, doctoral and first professional degrees 1900-1974

No breakout into disciplines
No minority figures

36. Higher Education: Earned Degree Conferred
1971-1972
National Center for Educational Statistics NCES-75 108
Department of Health, Education and Welfare

Data on bachelor's, master's, Ph.D., by discipline, sex and school

No minority statistics

37. Higher Education - Fall Enrollment in Higher Education
1973
U.S. Department of Health, Education and Welfare
Education Division - National Center for Education Statistics NCES 75-121

Enrollment by type of institute and sex.

No discipline figures or minority figures

38. Racial and Ethnic Enrollment Data from Institutions of Higher Education
U.S. Department of Health, Education and Welfare
Office of Civil Rights Fa-1 1972

Data on aggregate and regional minority enrollment in the United States in undergraduate, graduate and professional programs.

Data shows only total enrollment, no graduate data or disciplines, or minority statistics

39. Higher Education - Students Enrolled for Advanced Degrees
1972 Fall
National Center for Educational Statistics
NCES 76-132
U.S. Department of Health, Education and Welfare

Data on enrollment by institution and discipline by sex. No minority figures

SOURCES NOT USED

40. Publication of the United States Department of the Interior Bureau of Indian Affairs
Estimates of Resident Indian Population and Labor Force Status; By State and Reservation: March 1973
June 1973

Population, labor force, unemployment summaries of American Indians living on or near federal reservations.

Figures for persons registered on reservations only; does not give total Indian population.

Publications of the United States Department of Labor Bureau of Labor Statistics

41. Black Americans - a Chartbook
U.S. Department of Labor - Bureau of Labor Statistics
Bulletin 1699 - 1971

General characteristics of Black population - housing, labor force participation, housing, crime, education. Data based on 1970 census, later more detailed data available.

42. U.S. Department of Labor Employment Standards Administration Women's Bureau
Chairpersons and Executive Directors of Commissions, Committees and Councils on Status of Women
June 1974

Names and addresses by state of chairpersons

No statistics

43. Summary: Special Labor Force Report: Educational Attainment of Workers
March 1975
Department of Labor

Statistics on educational attainment by occupation, sex and race.

No usable statistics

44. Employment of Scientists and Engineers
U.S. Department of Labor, Bureau of Labor Statistics 1973

No useable statistics.

45. Geographic Profile of Employment and Unemployment Report 431 1973
U.S. Department of Labor, Bureau of Labor Statistics

Employment and unemployment by age, race and geographic region for 1973.
General employment and unemployment statistics no breakout for occupational categories.

46. Handbook of Labor Statistics 1974
U.S. Department of Labor Bureau of Labor Statistics
Bulletin 1825

Labor force status, unemployment rate, enrollment, educational attainment of workers, income by age, race, sex, industry and occupational group.
Statistics to 1973 only. More recent data available in Manpower Report of the President 1975.

47. Job Losers, Leavers and Entrants: Traits and Trends
Special Labor Force Report 157
U.S. Department of Labor, Bureau of Labor Statistics 1973

Unemployment rates by age, group, sex, unemployment rate by occupation and by races.
Rates not calculated by sex, detailed occupation and race.

48. Jobseeking Methods Used by Unemployed Workers
Special Labor Force Report 150
U.S. Department of Labor - Bureau of Labor Statistics 1973

Jobsearch methods of unemployed workers
No useable statistics

49. Library Manpower: A Study of Demand and Supply
Bulletin 1852
U.S. Department of Labor Bureau of Labor Statistics
1975

Current library workforce, projections of demand to 1985; educational attainment and income of librarians.
No minority statistics

50. Manpower Report - Message from the President of the United States 1974
U.S. Department of Labor

Labor statistics to 1973, unemployment and labor force participation in broad occupational groups.
Later statistics available in Manpower report of 1975.

Publications of U.S. Department of Labor
Women's Bureau

51. "Facts on Women Workers of Minority Races"

General worker traits of minority women workers.
No useable statistics

52. "Twenty Facts on Women"

General characteristics of women workers.
No statistics

53. "Women in Professional and Technical Positions"

Broad occupational group participation rates.
No useable statistics

54. "Women in Professional Training"

Enrollment and 1st professional graduates.
No useable statistics.

55. "Women in the Labor Force"
July 1974/75. September 1974/75

Labor force participation, employed and unemployed women. Total and minority women by broad occupational groups.
More recent data available.

56. "Women Workers Today"

General worker traits for females
No statistics

Publications of the Women's Equity Action League (WEAL)

57. WEAL - Proportion of Doctorates Earned by Women by Area and Field 1960 - 1969, June 1971

Data on number and percentage of female doctorates by detailed field of study.
No useable statistics

58. WEAL Fund Report - Women Graduates
August 1975

Statistics on women earning degrees by field of study for 1960 - 1972
No minority figures, no useable women statistics

APPENDIX A2: WORKSHEETS

This Appendix contains worksheets which were used for making 1974 projections for Asian-Americans and American Indians. The worksheets focus on the population growth and growth in the labor force for these two minorities.

Also, included are worksheets for the Professional job groups. The statistics for these worksheets came from the sources discussed in Section 8.

A2.1 ASIAN AMERICAN WORKSHEETS

The total Asian-American population in 1970 was 1,526,401, PC(1)D1 Detailed Characteristics, Table 190). After extracting the AsianAmericans residing in Hawaii (outside the continental U.S.) the figure was 1,096,366 (Subject Reports, Japanese, Chinese and Filipinos in the U.S., PC2-1G). The population figure was obtained by extrapolating proportions of the entire populations from PC(1)D1 figures since PC2-1G only contained figures for the population sixteen years and over. It should be noted that aliens have not been extracted from these figures due to the lack of source data.

	Japanese	Chinese	Filipino	Korean	Hawaiian
Total U.S.	586,675	433,469	336,823	70,598	98,836
Continental U.S.	374,064	382,148	248,137	61,625	30,392

Of the total, Japanese, Chinese and Filipinos comprise 91.6% of all Asian-Americans in the Continental United States.

Using the known statistics for Professional workers in the categories of Japanese, Chinese and Filipinos and the mean percent of these applied to Hawaiians and Koreans, the estimated 1970 Asian American Professional workers are 104,254 (Socio-Economic Characteristics-Vol. II Asian Americans 1971 HEW OS75-121).

Table A2.1 illustrates the various statistics used in obtaining final population figures.

TABLE A2.1: ASIAN AMERICAN WORKSHEETS

Chinese	Total	Male	Female
Total Population (PC(1)D1)	433,469	227,163	206,306
Population 16+(PC2 1G)	308,905	163,983	145,012
Hawaii Residents 16+	36,573	18,224	18,349
% Hawaii Res. of 16+	11.84%		
Est. Cont. U.S. Pop.	382,148	200,268	181,880
Civilian Labor Force (Cont.U.S.)	166,169	104,318	61,851
Professionals (Cont. U.S.)	42,147	30,148	11,999
Officials & Managers	14,242	11,892	2,350
Unemployed (Cont. U.S.)	5,686	3,203	2,483
Japanese			
Total Population (PC(1)D1)	586,675	270,926	315,749
Population 16+(PC2-1G)	438,954	194,980	243,974
Hawaii Residents 16+	159,066	75,286	83,780
% Hawaii Res. of 16+	36.24%		
Est.Cont. U.S. Population	374,064	172,742	201,322
Civilian Labor Force(Cont.U.S.)	163,495	90,865	72,630
Professionals (Cont. U.S.)	30,902	19,354	11,548
Officials and Managers	13,391	10,631	2,760
Unemployed (Cont. U.S.)	4,749	2,199	2,550

Filipino	Total	Male	Female
Total Population (PC(1)D1)	336,823	183,010	153,813
Pop 16 + (PC2-1G)	226,480	125,756	100,724
Hawaii Residents 16 +	59,633	35,576	24,057
% Hawaii Residents 16 +	26.33%		
Est. Pop. Cont. U.S.	248,137	134,823	113,314
Civilian Labor Force	100,956	56,962	43,994
Professionals (Cont. U.S.)	24,300	10,310	13,990
Officials/Managers	2,514	1,766	748
Unemployed	5,261	3,194	2,067

Korean			
Total Pop.(PC(1)D1)	70,598	28,491	42,107
Pop 16+ PC2 - 1G)	47,058	28,491	42,107
Hawaii Residents 16+	5,979	2,748	3,231
% Hawaii Residents 16+	12.71%		
Est. Pop. Cont. U.S.	61,625	24,870	36,755
Civilian Labor Force	21,584	11,328	10,256
Professionals (Cont. U.S.)	4,598	2,311	2,287
Officials/Managers	1,392	1,054	338
Unemployed	1,032	457	575

Hawaiians	Total	Male	Female
Total Populations PC(1)D1	98,836	48,710	50,126
16+ (PC2-1G)	62,207	30,309	31,898
Hawaii Residents 16+	43,079	20,681	22,398
% Hawaii Residents 16+	69.25%		
Est. Pop. Cont. U.S.	30,392	14,978	15,414
Civilian Labor Force	10,870	6,168	4,702
Professionals (Cont.U.S.)	2,307	1,258	1,049
Officials/Managers	729	574	155
Unemployed	734	437	297

Total Asian Americans			
Pop. U.S.Total	1,526,401	758,300	768,101
Pop. Cont. U.S.	1,096,366	547,681	548,685
Civilian Labor Force	463,074	269,641	193,433
Unemployed	17,462	9,490	7,972
Professionals (Cont.U.S.)	104,254	63,381	40,873
Officials/Managers*	32,268	25,917	6,351

*Totals projected from mean proportions of Chinese, Japanese and Filipino Professionals and Officials and Managers respectively.

It should be noted that although the statistics reflect availability for the Continental U.S., population figures for persons living in Hawaii and Alaska were included in this report for all persons except Asian-Americans living in Hawaii. The approximate total populaton figure for Alaska in 1970 was 301,000 and for Hawaii, 1,398,000. The two figures combined comprise only 0.8% of the total U.S. population. After taking into account a greater than one percent population growth per year, the accuracy of statistical estimations, and the small proportion of the total United States population that reside in Alaska and Hawaii, exclusion of this segment from the total population figure is considered unnecessary.

A2.2 ASIAN AMERICAN PROJECTIONS FOR 1974

A2.2.1 Population

It has been assumed that the birth rate among Asian Americans is comparable to national total 17.5 per 1,000 (HEW (OD) 75-121) whereas death rate was 9.3 per 1,000. Projected increases in population are:

1970	1,096,000
1971	1,105,000
1972	1,114,000
1973	1,123,000
1974	1,132,000

Added to this are the immigration totals of 1971-1974 (363,402) less estimated proportion who immigrated to Hawaii (27% - proportion of entire U.S. Asian American population in Hawaii).

Adjusted Continental U.S. Asian American Immigration:

228,943

Adjusted Asian American population 1974

1,360,943

A2.2.2 Labor Force

There is no reason to assume labor force participation has changed from 1970 to 1974 for Asian Americans other than population change. Using 1970 labor force participation rate and 1974 projected population change and immigrant labor force:

1974 labor force participation is:

1974 Labor Force due to population change	478,284
Immigrants Labor Force	73,241
	561,525

A2.2.3 Unemployment

In 1970, 22.5% of Asian American labor force are Professional and Technical workers compared to corresponding U.S. total proportion 13.7%. Therefore, the unemployment rate for Asian Americans should be adjusted accordingly in the 1974 projection since Professional unemployment rate was 2.3% compared to 5.6% for entire labor force.

152,766 x 2.3%	=	3513
408,759 x 5.6%	=	22891
		26404

Since Asian American unemployment in 1970 was below national total it has been assumed that in 1974 it reached national total.

A2.2.4 Professional category

1970 Professional category	104254
1974 Professionals due to population change	107678
Immigrant Professional workers	45088
1974 Projected Professionals	152766

A2.3 AMERICAN INDIAN PROJECTIONS FOR 1974

A2.3.1 Population 1970 792,730

(Study of Socio-Economic Characteristics Vol. III - American Indians - HEW OS 75-122)

Birth Rate (1971) 33 per 1,000

Death Rate (1971) 7.72 per 1,000

Projected 1974 American Indian Population: 876,960

A2.3.2 Labor Force

An assumption is made that any increase in labor force participation will increase at the same rate for American Indians as for national totals, since

1970	National	Total American Indian	Urban	Rural
Male	77%	63%	72%	56%
Females	41%	35%	42%	29%

(HEW 07 75-122, Tab A-1, C-1, F1)

Increase in labor force in 1974 due to people 11-15 years of age in 1970 using above rates of participation would be (PC1D1, Tab 190):

American Indian Labor Force increase

	Total	M	F
1970 - 1974	46,545,000	29,876,000	16,669,000

Using the proportionate death rates for those in the labor force 1970 to show decrease

23 x 771.7 x 4 years - 7,099

(Death Rate/100,000) (1974-1970)

Assuming that those Indians 60 to 64 in 1970, were proportionately in the labor force and that they retired - labor force decrease for this reason would be: (This age group is proportionate Urban/Rural as rest of American Indian population.)

	Total	M	F
1970 Total Population 60-64	20174	9642	10532
Pop 60-64 LF Participants	9733	6047	3686

Adjusted American Indian LF increase due to age shifts, deaths, and retirements: 29713

In addition Labor Force/Total Population has change from 1970 to 1974 as follows:

1970	1971	1972	1973	1974
40.7%	40.8%	41.6%	42.3%	43.0%

This increase of 5.7% in Labor Force Population is due primarily to an increase of persons working, i.e., women entering the labor force, younger people working sooner, etc. Total American Indian labor force has been adjusted upwards accordingly.

American Indian 1970	229870
Age Shift Changes + 5.7% Increase	29713
1974 Projected American Indian Labor Force	274379

A2.3.3 Unemployment

Since American Indians unemployment rate in 1970 was unrelated to national totals, 11.1% compared to 4.9% or Black unemployment rate, 7.54% an assumption is made that American Indian unemployment rate has increased proportionately to Black unemployment 8.1% rate for 1970 and 10.40% for 1974 and adjusted unemployment rate at 14.20%. Although this appears to be a high rate it is likely there should be some increase in unemployment as there was nationally and the lowest rate for 1970 would be 11.1%.

A2.3.4 Professional Category

There is no reason to assume that the proportion of American Indians in this category to the American Indian labor force has changed 9.7%.

TABLE A2.2 REQUISITE SKILLS FOR ENGINEERS - WORKSHEET

ENGINEERS	TOTAL	WOMEN	TOTAL MINORITY	BLACK	SPANISH ORIGIN	ASIAN AMERICAN	AMERICAN INDIAN
1970 Labor Force	1,192,356	20,286	50,739	14,808	17,133	17,656	1,142
%	100.0	1.70	4.25	1.24	1.44	1.48	0.09
Total Degrees 1971-1974	172,193	2,778	10,056	2,704	3,862	3,332	158
1974 Requisite Skills Factor 4	1,364,549	23,064	60,795	17,512	20,995	20,988	1,300
%	100.0	1.69	4.45	1.28	1.54	1.54	0.09

173

TABLE A2.3 REQUISITE SKILLS FOR CHEMICAL ENGINEERS - WORKSHEET

CHEMICAL ENGINEERS	TOTAL	WOMEN	TOTAL MINORITY	BLACK	SPANISH ORIGIN	ASIAN AMERICAN	AMERICAN INDIAN
1970 Labor Force	54,217	579	2,017	389	681	860	87
%	100.0	1.06	3.72	0.72	1.25	1.58	0.16
Total Degrees 1971-1974	14,437	448	540	119	159	246	16
1974 Requisite Skills Factor 4	68,654	1,027	2,557	508	840	1,106	103
%	100.0	1.50	3.72	0.74	1.22	1.61	0.15

TABLE A2.4 REQUISITE SKILLS FOR CIVIL ENGINEERS - WORKSHEET

CIVIL ENGINEERS	TOTAL	WOMEN	TOTAL MINORITY	BLACK	SPANISH ORIGIN	ASIAN AMERICAN	AMERICAN INDIAN
1970 Labor Force	178,334	2,623	10,486	2,485	3,570	4,002	429
%	100.0	1.47	5.88	1.39	2.00	2.24	0.24
Total Degrees 1971-1974	28,959	308	1.476	345	464	636	31
1974 Requisite Skills Factor 4	207,293	2,931	11,962	2,830	4,034	4,638	460
%	100.0	1.41	5.77	1.36	1.95	2.23	0.22

TABLE A2.5 REQUISITE SKILLS FOR ELECTRICAL ENGINEERING - WORKSHEET

ELECTRICAL ENGINEERING	TOTAL	WOMEN	TOTAL MINORITY	BLACK	SPANISH ORIGIN	ASIAN AMERICAN	AMERICAN INDIAN
1970 Labor Force	290,185	4,948	13,843	4,130	4,102	5,373	238
%	100.0	1.70	4.77	1.42	1.41	1.85	0.08
Total Degrees 1971-1974	47,605	428	3,306	1,099	757	1,435	15
1974 Requisite Skills Factor 4	337,790	5,376	17,149	5,229	4,859	6,808	253
%	100.0	1.59	5.08	1.55	1.44	2.01	0.07

TABLE A2.6 REQUISITE SKILLS FOR MECHANICAL ENGINEERING - WORKSHEET

MECHANICAL ENGINEERING	TOTAL	WOMEN	TOTAL MINORITY	BLACK	SPANISH ORIGIN	ASIAN AMERICAN	AMERICAN INDIAN
1970 Labor Force	185,406	1,830	6,723	1,927	2,299	2,396	101
%	100.	0.98	3.63	1.04	1.24	1.29	0.05
Total Degrees 1971-1974	33,382	204	1,898	668	466	737	27
1974 Requisite Skills Factor 4	218,788	2,034	8,621	2,595	2,765	3,133	128
%	100.0	0.93	3.94	1.19	1.26	1.43	0.06

177

TABLE A2.7 REQUISITE SKILLS FOR METALLURGICAL ENGINEERS - WORKSHEET

METALLURGICAL ENGINEERS	TOTAL	WOMEN	TOTAL MINORITY	BLACK	SPANISH ORIGIN	ASIAN AMERICAN	AMERICAN INDIAN
1970 Labor Force	16,285	128	447	159	167	121	
%	100.0	0.78	2.74	0.97	1.02	0.74	
Total Degrees 1971-1974	2,401	36	62	4	34	24	
1974 Requisite Skills Factor 4	18,686	164	509	163	201	145	
%	100.0	0.88	2.72	0.87	1.08	0.78	

TABLE A2.8 REQUISITE SKILLS FOR MATHEMATICS - WORKSHEET

MATHEMATICS	TOTAL	WOMEN	TOTAL MINORITY	BLACK	SPANISH ORIGIN	ASIAN AMERICAN	AMERICAN INDIAN
1970 Labor Force	56,929	16,017	4,346	2,418	744	1,059	125
%	100.0	28.13	7.63	4.25	1.30	1.86	0.22
1972 College Population %			9.77	5.43	1.66	2.38	0.28
Degree Total 1971-1974	94,488	37,017					
1974 Requisite Skills Factor 4	151,417	53,034	13,568	7,549	2,323	3,306	390
%	100.0	35.03	8.96	4.99	1.53	2.18	0.26

TABLE A2.9 REQUISITE SKILLS FOR CHEMISTRY - WORKSHEET

CHEMISTRY	TOTAL	WOMEN	TOTAL MINORITY	BLACK	SPANISH ORIGIN	ASIAN AMERICAN	AMERICAN INDIAN
1970 Labor Force	127,172	15,102	10,836	4,235	2,520	3,885	196
%	100.0	11.87	8.52	3.33	1.98	3.05	0.15
Total Degrees 1971-1974	42,682	8,142	5,833	2,282	1,357	2,090	104
1974 Requisite Skills Factor 4	169,854	23,244	16,669	6,517	3,877	5,975	300
%	100.0	13.68	9.81	3.84	2.28	3.52	0.18

TABLE A2.10 REQUISITE SKILLS FOR BIOLOGY - WORKSHEET

BIOLOGY	TOTAL	WOMEN	TOTAL MINORITY	BLACK	SPANISH ORIGIN	ASIAN AMERICAN	AMERICAN INDIAN
1970 Civilian Labor Force	49,944	14,871	4,406	1,901	733	1,666	106
%	100.0	29.77	8.82	3.80	1.46	3.33	0.21
1972 College Population			18.02	7.78	2.99	6.82	0.43
%							
Total Degrees 1971-1974	148,511	44,077					
1974 Requisite Skills Factor 4	198,455	58,948	31,167	13,455	5,173	11,794	745
%	100.0	29.70	15.71	6.78	2.61	5.94	0.38

TABLE A2.11 REQUISITE SKILLS FOR PHYSICS - WORKSHEET

PHYSICS	TOTAL	WOMEN	TOTAL MINORITY	BLACK	SPANISH ORIGIN	ASIAN AMERICAN	AMERICAN INDIAN
1970 Labor Force	37,183	1,594	2,214	474	694	1,028	18
%	100.0	4.28	5.95	1.27	1.86	2.76	0.05
Total Degrees 1971-1974	19,333	1,384	1,012	353	155	484	20
1974 Requisite Skills Factor 4	56,516	2,978	3,226	827	849	1,512	38
%	100.0	5.27	5.71	1.46	1.50	2.68	0.07

TABLE A2.12 REQUISITE SKILLS FOR ACCOUNTANTS - WORKSHEET

ACCOUNTANTS	TOTAL	WOMEN	TOTAL MINORITY	BLACK	SPANISH ORIGIN	ASIAN AMERICAN	AMERICAN INDIAN
1970 Labor Force	720,617	183,717	39,859	16,590	13,819	8,777	673
%	100.0	25.49	5.53	2.30	1.92	1.22	0.09
1974 Unemployment Rate in Professional Category	2.3%	2.9%	4.3%				
1974 Employed	803,000	190,311	(Black & other) 46,574				
1974 Requisite Skill Factor 4	821,904	195,995	74,493	31,006	25,827	16,406	1,256
%	100.0	23.85	9.06	3.77	3.14	2.00	0.15

TABLE A2.13 REQUISITE SKILLS FOR COMPUTING/DATA PROCESSING-WORKSHEET

COMPUTING/ DATA PROCESSING	TOTAL	WOMEN	TOTAL MINORITY	BLACK	SPANISH ORIGIN	ASIAN AMERICAN	AMERICAN INDIAN
1970 Labor Force	263,149	51,527	16,896	9,128	4,080	3,462	226
%	100.0	19.58	6.42	3.47	1.55	1.31	0.08
1974 Unemployment Rate Professional Category	2.3%	2.9%	4.3%				
1974 Employed	311,000	59,090	(Black & Others) 17,106				
%	100.0	19.00	5.50				
1974 Requisite Skills Factor 4	318,321	60,855	18,702	12,730	5,445	4,828	315
%	100.0	19.12	9.67	4.00	1.71	1.52	0.10

TABLE A2.14 REQUISITE SKILLS FOR NURSING - WORKSHEET

NURSING	TOTAL	WOMEN	TOTAL MINORITY	BLACK	SPANISH ORIGIN	ASIAN AMERICAN	AMERICAN INDIAN
1970 Labor Force	848,182	825,963	96,150	66,400	17,077	10,757	1916
%	100.0	97.38	11.34	7.83	2.01	1.27	0.22
1974 Employed	904,000	885,920	(Blacks & Others) 91,304				
%	100.0	98.0	10.1				
1974 Unemployment Rate Professional Category	2.3%	2.9%	4.3%				
1974 Requisite Skills Factor 4	925,281	912.379	116,009	80,115	20,604	12,979	2311
%	100.0	98.61	12.54	8.66	2.23	1.40	0.25

TABLE A2.15 REQUISITE SKILLS FOR PHYSICIANS - WORKSHEET

PHYSICIANS	TOTAL	WOMEN	TOTAL MINORITY	BLACK	SPANISH ORIGIN	ASIAN AMERICAN	AMERICAN INDIAN
1970 Labor Force	280,557	25,133	26,657	6,044	10,451	9,987	175
%	100.0	8.96	9.50	2.15	3.72	3.56	0.06
1974 Employed	346,000	33,908	(Black & Others) 32,870				
Requisite Skills Factor 4 1974	346,000	33,908	54,068	12,259	21,198	20,256	355
%	100.0	9.80	15.63	3.54	6.13	5.85	0.10

TABLE A2.16 REQUISITE SKILLS FOR ECONOMISTS - WORKSHEET

ECONOMISTS	TOTAL	WOMEN	TOTAL MINORITY	BLACK	SPANISH ORIGIN	ASIAN AMERICAN	AMERICAN INDIAN
1970 Labor Force	77,517	8,105	3,669	1.701	1,302	564	102
%	100.0	10.45	4.73	2.19	1.68	0.73	0.13
Total Degrees 1971-1974	61,924	7,514					
1974 Requisite Skills Factor 4	139,441	15,619	7,070	3,278	2,509	1,087	196
%	100.0	11.20	5.07	2.35	1.80	0.78	0.14

TABLE A2.17 REQUISITE SKILLS FOR LIBRARIANS - WORKSHEET

LIBRARIANS	TOTAL	WOMEN	TOTAL MINORITY	BLACK	SPANISH ORIGIN	ASIAN AMERICAN	AMERICAN INDIAN
1970 Labor Force	130,154	102,492	12,064	8,274	1,954	1,638	198
%	100.0	78.75	9.27	6.36	1.50	1.25	0.15
1974 Employed	189,000	154,413					
1974 Unemployment Rate Professional Category %	2.3	2.9	4.3				
1974 Requisite Skills Factor 4	193,449	159,025	18,395	12,827	3,029	2,539	307
%	100.0	82.20	9.50	6.63	1.57	1.31	0.15

TABLE A2.18 REQUISITE SKILLS FOR LEGAL - WORKSHEET

LEGAL	TOTAL	WOMEN	TOTAL MINORITY	BLACK	SPANISH ORIGIN	ASIAN AMERICAN	AMERICAN INDIAN
1970 Labor Force	280,700	13,514	7,272	3,365	2,555	1,042	310
%	100.0	4.81	2.60	1.20	0.91	0.37	0.11
1972 Student Population %				11.81			
1974 Employed	359,000	25,130					
Proportion of Increase from 1971-1974 %				7,744		849	253
				9.89		1.08	0.32
1974 Requisite Skills Factor 4	359,000	25,130	21,998	11,109	8,435	1,891	563
%	100.0	7.05	6.13	3.09	2.35	0.53	0.16